Victoria University of Technology

Sustainable development in Vietnam: the case of wastewater re-use in the district of Thanh Trì.

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Abstract

This thesis explores the barriers to, and the opportunities for, sustainable development in Vietnam. To provide the theoretical context, a critique of the dominant social paradigm by the proponents of social ecology is presented. Some aspects of the social ecological model of strong sustainability are used as a method of analysing current political, economic and environmental developments in Vietnam.

To provide the empirical context, examples of the growth of environmentalism in Eastern Europe and the former Soviet Union during the transitionary period of the late 1980s are used to illustrate the potential for grassroots political action, decentralised environmental initiatives and the response of the former socialist governments to these developments. Likewise some aspects of Thai environmentalism are considered.

The embryonic environment movement in Vietnam is explored in the light of the European socialist and contemporary Thai experience. The features of three environmentally-orientated groups in Vietnam are described and the impact they have on policy formulation and implementation is investigated.

The development of techniques to utilise the wastewater generated in Hanoi by the farmers of the downstream district of Thanh Trì is examined in terms of the potential for strong sustainability. Likewise the barriers to the extension of environmentally sound food production techniques are considered in terms of the impacts of the economic liberalisation under *Đổi Mới*.

The history and current form of Vietnam's national strategy for sustainable development is reviewed within the framework of a social ecological view of strong sustainability, with particular emphasis on those sectors pertinent to the reuse of wastewater for food production. The barriers to greater sustainability are considered in terms of the weakness of environmental regulation in Vietnam and the inappropriateness of imported policy models.

It is concluded that while some developments in Vietnam are consistent with models of strong sustainability, overall the commitment to sustainable development is rhetorical and environmental policy is too weak to allay continued environmental degradation.

Declaration

This thesis contains no material which has been previously submitted for any other academic award.

To the best of the candidate's knowledge, this thesis contains no material previously published or written by another person except where reference is made in the text of the thesis.

Signed..... Date.....

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Table of Contents

Key Acronyms and Abbreviations

AIDAB	Australian International Development Assistance Bureau (now Aus AID)
CT	Clean Technology
CIDA	Canadian International Development Agency
DSP	Dominant Social Paradigm
EIA	Environmental Impact Assessment,
EIS	Environmental Impact Statement
ENSIC	Environmental Systems Information Centre
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
HCMC	Ho Chi Minh City Thành Pho Hồ Chí Minh
IUCN	International Union for the Conservation of Nature
ISM	Institute of Scientific Management
MOH	Ministry of Health
MOSTE	Ministry of Science, Technology and Environment.
NPESD	National Plan for Environment and Sustainable Development
ODA	Official Development Assistance
SCS	State Committee for Science
SD	Sustainable Development
SRV	Socialist Repblic of Vietnam
SS	suspended solids
SIDA	Swedish International Development Agency
SPC	State Planning Committee
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund
VAC	*Vườn, Ao, Chăn nuôi*, or Garden, Pond and Livestock.
WCED	World Conference on the Environment and Development
WHO	World Health Organisation
WWF	Worldwide Fund for Nature

Note on the use of Vietnamese: Where possible this text includes Vietnamese complete with tone marks except for the commonly used anglicised versions of Hanoi and Vietnam.

List of Tables

List of Figures

List of Plates

Chapter One

Purpose of Investigation and Organisation of Study

1.1 Introduction

In this chapter the various contextual dimensions of the study are described. The study aims to explore and examine certain aspects of development in Vietnam in terms of assessing the opportunities for, and the barriers to a more sustainable and ecologically sound development pattern. An overview of the concept of Sustainable Development (SD) is given. The study's objectives and the research questions are also given. The last section in this chapter contains summaries of the remaining chapters.

Figure 1: Location of Hanoi in Vietnam

1.2 Context of the Study

1.2.1 The Physical Context

Vietnam lies almost entirely within tropical Southeast Asia and therefore has a predominantly monsoonal weather pattern of dry and wet seasons and a generally warm humid climate. Its principal physical features are a long coast line and two large delta systems, the Red River in the north, and the Mekong River in the South. Except for the deltas the country is mountainous. The delta areas of Vietnam are the most densely populated and the most economically productive. The Red River delta is one of the most densely populated regions on earth and has a very high rice production level per hectare.

Located at a latitude of 22^0 North, Hanoi has distinct seasons, with high mean summer temperatures and cooler winters. High rainfall, particularly in the summer, creates significant drainage and flooding problems for the city. Over 150 kms of dykes along the Red River built over hundreds of years, protect Hanoi from the river's seasonal flooding, and also reduce the natural drainage of the city. Almost all drainage from Hanoi is restricted to very low gradient rivers that parallel the Red River. These slow moving rivers rejoin the Red River some kilometres south of the urban area. This restriction in the natural flow contributes to the regular inundation by flood water of lower lying parts of the city during the wet season. The minor rivers and canals that drain Hanoi also carry most of the untreated sewage and industrial liquid waste from the city. These rivers flow through the district of Thanh Trì which lies to the immediate south of the Hanoi urban area (see figure 1, chapter 6). Thanh Trì is a predominantly rural district, with some industry and a moderately high population density. The villages of Trấn Phu, Thịnh Liệt and Yên Sở in the northern part of Thanh Trì are the focus of the case study which explores the issue of wastewater re-use by the farmers in the district.

1.2.2 The Social Context

Vietnam began the post-war reunification period from a very low level of development. From 1975 to the early 1980s, poor economic results led to incremental modification of the centrally planned economic production policy, culminating in the revolutionary economic reform policy of *Đổi Mới*[1] or renovation, in 1986. The *Đổi Mới* policy directed the economy away from central planning and state ownership to a mixed economy with private capitalism as a new component. These reforms are important to the assessment of the

[1]The general consensus on the origins of Vietnam's current development direction is that it was inspired by the recognition in the early 1980s that previous economic policy was inadequate to meet the development goals that the Party had set. Vietnamese analysts have described the process as a, 'a total renewal of the style of thinking', (Trần Đính Gián 1991: 30).

potential for SD for a number of reasons. For example, there has been an opening-up of the economy to outside investment and increasing interaction with the global economy. Increased investment, while required, will lead to increased pressure on the natural resources and more pollution. One study (Lê and Rambo 1993) concludes that agricultural production in the Red River Delta using current techniques will probably decline as it is heavily dependent on 'imported technology in the form of seed, fertiliser, pesticide and fuel for irrigation pumps' (Tria Kerkvliet 1995: 22). How well these two impacts are minimised depends on the effectiveness of Vietnamese environmental and agricultural policy. In addition, and as the basis of the case study of potentially sustainable food production and waste treatment, the impact of market based economics on the wastewater re-use in Thanh Trì is also explored (see chapter 6).

As these changes were unfolding in Vietnam during the late 1980s, many in the developed world were drawing closer links between the growing evidence of environmental degradation and the type of industrial development that has become the predominant global model. Increasing evidence of pollution and environmental degradation in Vietnam raises the question of whether Vietnamese environmental regulation will be sufficient to mitigate against the environmental impacts of the type of industrial and agricultural development expected under *Đổi Mới*. This is not to suggest that industrial and agricultural development is not desperately needed; the questions raised are directed at the nature of that development. The author does not support the notion that environmentally sustainable salvation will come from the pursuit of backward technologies, indeed the opposite is true. There is a need to pursue any technology that achieves the greatest socio-environmental outcome regardless of the so-called age of that technology or style of development.

1.2.3 The Environmental Context

There are a number of historical factors that have had an impact on Vietnam's environmental conditions. A long period of colonial rule by the French followed by a protracted struggle for independence has depleted the country's resources. The horrific conflict with the United States (US) and its allies not only had a tragic human dimension but was also ecologically devastating, as large parts of the country were laid to waste and poisoned by chemicals, the full impacts of which are still not clear. The Vietnamese government believes the residual high levels of dioxin, a by-product of the defoliant used by the US and a known carcinogen and mutagen, are still responsible for high levels of 'birth defects, cancers and spontaneous abortions' (SRV 1996: 4). The development of highly polluting industries since the 1950s continues to degrade the environment throughout Vietnam and directly impacts on the health of residents and workers. A concentration of the most environmentally offensive industry is located at Viet Tri upstream from Hanoi. Many toxic industrial processes such as chemical manufacturing, textile dyeing and leather tanning are located within Hanoi and directly pollute the canals and rivers that drain the city. In addition the city has no formal sewage treatment facility and much of this waste flows directly from the city south into the district of Thanh Trì. The problems of chronic pollution problems in urban Vietnam are now well recognised; 'urban and industrial water and air pollution has become critical in Vietnam's major cities' (World Bank 1995: 54).

The farmers of the district of Thanh Trì have traditionally used the nutrient rich wastewater from Hanoi to irrigate their crops and since the late 1960s cooperatives in the district have developed aquaculture enterprises. Although the re-use of the organically polluted wastewater from Hanoi is an excellent example of environmentally-sound development, the impact of chemical pollution has not been fully studied. The initial goal of the wastewater fed aquaculture system was to improve food security during the war with the US (see

chapter 6). The system has continued, however, because it is productive and profitable. The wastewater is re-used, not as part of a deliberate treatment process, but to extract as much economic advantage from the nutrients as possible. Such a practice is consistent with the latest thinking in the West on wastewater treatment and re-use within a sustainable development strategy and has many parallels throughout Asia. This situation raises questions about what is a resource and what is waste and these issues are fundamental to a strategy for sustainable agricultural development (see chapter 6). The process also raises questions about how the positive environmental and economic aspects can be maintained and any negative ones overcome.

1.2.4 Technological Context

Vietnam is coming under increasing pressure to adopt new technology in order to 'modernise'. The adoption of new technology is often driven by nothing more rational than 'technological determinism', which is the belief that technological change creates its own momentum and proliferates the notion that anything 'new' is inherently better than that which existed before. In recent years, there has been growing concern by both Vietnamese authorities and foreign aid providers that Hanoi does not have a 'modern' sewage and wastewater treatment system. What is not yet widely recognised is that the current 'system' has many features that contribute to a high potential for ecological sustainability when measured using 'alternative' criteria. For example, one of the more radical SD concepts is the recognition that many traditional and low technology methods of production, both agricultural and industrial, are less resource-dependent and waste producing. This means that where these methods are being abandoned for new, and supposedly, more cost efficient methods, the long term cost in terms of the environment will be greater. This thesis argues that there are elements of traditional production in the district of Thanh Trì that, if managed according to current research on 'alternative' agriculture, would have far greater potential for environmental sustainability than any new and possibly more

expensive and less sustainable technology. This thesis considers as a case study the re-use of wastewater in the district of Thanh Trì for boosting agriculture and aquaculture production, as an example of traditional production that should be extended not reduced, while at the same time acting as a waste treatment system. This is not to suggest that the system as practiced in Thanh Trì is a museum and should be maintained simply because it has the credibility of history, on the contrary this thesis argues that the approach can be improved but that the use of wastewater in itself fundamentally a sound and sophisticated technology.

1.2.5 The Development and Policy Context

The way in which Vietnam avoids the widely recognised environment management pitfalls of rapid industrial development is centrally important to this study. This thesis considers two parallel developments the bureacratic reponse and the potential for locally based initiatives.

> Growth, expansion, entrepreneurship, and personal financial success are encouraged and celebrated, but concerns about equity, distribution, quality and extent of public services, and environmental costs and sustainability are also evident. How to combine these components is a basic question reflected in many debates in numerous quarters of the country, government and non-government alike. No doubt economic growth is necessary, but if that alone is the primary goal, then environmental and social costs can be immense (Tria Kerkvliet 1995: 31).

Vietnam's current development 'goal' is unambiguously contained within the following extract from the National Constitution of the Socialist Republic of Vietnam 1992:

> to make the people rich and the country strong, satisfy to an ever greater extent the people's material and spiritual needs by releasing all productive potential, developing all latent possibilities of all components of the economy - the State sector, the collective sector, the private individual sector, the private capitalist sector and the State capitalist sector in various forms - pushing on with the construction of material and technical bases, broadening economic, scientific, technical cooperation and expanding intercourse with the world markets (Article 16) (Socialist Republic of Vietnam, National Constitution, SRV 1992a).

Vietnam's current development policy is appropriately to increase the wealth of the country by 'all latent possibilities of all components of the economy' (SRV 1992a). Economic growth is clearly the priority, as it should be, given Vietnam's very low GDP per capita of approximately US $273 (Fforde 1996: 20). The Constitution does not specify how this will be achieved, however environmentalists warn that following export-led, rapid industrialising models in the region will environmentally compromise the future. The impact of industrial development without environmental cosideration has caused enormous problems in other parts of asia. (asia stinks here) That a link exists between industrial development and environmental degradation is not controversial. There is, therefore, concern about the accelerated damage caused by rapid industrialisation and resource depletion in countries with little or no effective institutional or legal environmental protection. The framework for such protection in Vietnam is embodied in the National Plan for Environmentally Sustainable Development (NPESD) which aims:

1. to provide for the gradual development of a comprehensive framework for national and sub-national environmental planning and management; and
2. to lead to specific actions that are required in the short term to address priority problems at their very roots (SRV 1992b).

Inherent in these objectives are a number of factors that will have a bearing on the analysis of Vietnam's environmental policy which is dealt with in chapter 5. In the first aim the notion of planning at a national, or at least sub-national level, is indicative of a top-down centralist approach. The second aim suggests that the plan can adequately identify the 'problems at their very roots'. The identification of 'the problem' is the central issue if the aim is improved sustainability. One of the research questions of this thesis is, therefore, to

determine whether Vietnam's plan to achieve sustainability, as expressed in the NPESD, is viable. This thesis is critical of the potential of the national strategy to achieve SD, and these concerns are explored in chapter Five.

As cities throughout the world have expanded and industrialised, and Hanoi is no exception, the surrounding and often rich agricultural land is progressively consumed. This aspect of development has many negative implications from a sustainable development perspective. For example, the expanding area of sealed surfaces, such as roads and roofs, and reduced vegetation, creates increased run-off and this adds to the complexity of water management systems and the expense of flood control. A further negative impact of urbanisation is that it tends to reduce the biomass of a region and therefore reduces opportunities for CO^2 absorption and O^2 production. A further lost opportunity, which is central to this thesis, is the potential utilisation of the organic waste created by the urban population. At the moment, very little productive use is made of the sewage and other organic waste generated within cities generally, and in the West particularly. The waste is usually and inefficiently transported away or treated and disposed of at great expense. It follows, therefore, that organic material produced by the urban population, in this case wastewater and sewerage, should be utilised as productively and as close to the city as possible.

This thesis explores those aspects of Vietnamese policy, politics and agricultural development, which represent barriers to, or opportunities for SD. The question as to whether current development patterns are sustainable or not is contentious. SD in Vietnam is acknowledged by the government as a desirable goal, it is not however the first priority of government, if measured by the strategy taken to achieve it, or the seniority of the ministry overseeing that strategy. The Vietnamese Government has chosen a mainstream, reformist policy path toward a version of SD. This thesis is critical of this path and

contends the proposed SD strategy will be 'too little, too late', and by pursuing such a path, a number of opportunities for a higher level of SD, when defined within a more radical perspective, will be overlooked.

1.3 The Concept of Sustainable Development and Environmental Management in Developing and Developed Countries

Sustainable development (SD) is a concept that has evolved in response to growing evidence of the impact of industrial development. The term SD can be both controversial and misleading. It is misleading because it has been 'captured' by many, and often opposing positions. Likewise, no position seriously proposes no development of any type, nor that any proposed development should be deliberately unsustainable although allowance for some short term unsustainability may need to made in countries of very low initial development. Instead there is extensive debate about the causes of environmental degradation. One of the dominant mainstream views, particularly in the west is that rapidly increasing population in developing countries is the fundamental cause of environmental degradation. The more radical positions reject this and support the view that the cause is the fundamental injustice in the structure of the political economy which maintains the poverty of most for the benefit of a few who are degrading the environment in the process. The radical position on the issue of causation is that only radical restructuring of the political economy will result in a truly sustainable and environmentally harmonious situation.

The mainstream view, on the other hand, proposes that a program of adjustment and reform will be sufficient. To this end the World Commission for Environment and Development (WCED) in 1987 generated the definition of SD which is now most commonly used, although not followed throughout the world, as 'development that meets

the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987).

The WCED vision of SD does not challenge the dominant economic or political paradigm, instead the WCED, or mainstream environmental view, is to reform current unsustainable practices through the application of appropriate policies of environmental management. The radical position, on the other hand, 'stands outside the dominant political, economic and scientific world order. Together its various strands and actions challenge the hegemony of the dominant order' (Merchant 1992: 240). The more radical definition is, therefore, more specific about the implied cause of unsustainable development by requiring structural change for social justice and ecological sustainability. For example, Merchant defines the radical position as that which

> pushes social and ecological systems toward new patterns of production, reproduction and consciousness that will improve the quality of human and natural environment. It challenges those aspects of the political and economic order that prevent the fulfilment of basic human needs. It offers theories that explain the social causes of environmental problems and alternative ways to resolve them. It supports social movements for removing the causes of environmental deterioration and raising the quality of life for people of every race, class and sex (Merchant 1992: 9).

The radical SD positions are critical of the limited potential of environmental policy which is developed within a framework which does not challenge the dominant relationships. This position holds that the social, economic and political relationships within any given society tend to 'operate to constrain policy' (Goldsmith 1988: 118). Also that environmental policy, itself, is in danger of becoming 'empty, rhetoric, legal frameworks which will not function without fundamental changes to economic and political structures' if societies remain 'based on the cult of development, as opposed to the culture of sustainability' (Boer 1992: 4).

These two generalised SD positions do agree, however, on the need for improved participation. The reformist position is that there needs to be increased participation at the implementation stage of policy. For example, the World Bank, which increasingly embodies the reformist model, acknowledges the importance of collective management, by stating, for example, that, 'many collectively managed resources will play a central role in policies for sustainable development' (Bromley and Cernea 1989: 30). The radical positions require greater direct grassroots control of the process of policy formulation, which, in theory, will result in more successful implementation.

In this thesis these two generalised approaches to achieving SD are used as models for comparison with the evidence of what has actually occurred. This study considers the prospects for success of achieving better environmental management. The reformist position is, in this case, the mainstream one, and has been adopted at a national level in Vietnam. The position acknowledges the WCED definition of SD as 'appropriate' and deploys a platform of policy instruments to achieve it. According to the 'radical' positions the reformist position is defined as environmentally weak.

Evidently there is no clear model for the achievement of SD. The literature tends to assign stronger potential ecological sustainability to the radical perspectives and correspondingly weaker sustainability to the reformist positions (see chapter 2). Likewise the literature is overwhelmingly generated in affluent post-industrial western contexts and much of it is of limited application to the reality of low economic development situation in Vietnam. Assessment of the potential for SD in a context as broad as that of Vietnam must examine a range of factors. Such factors include physical, socio-political, institutional, technical and economic. This thesis describes case studies which focus on certain aspects that can contribute to SD in Vietnam. The literature review in the following chapter identifies those factors which contribute to either a reformist or radical approach.

1.4 Objectives and Research Questions

The principal objective is to identify the barriers to and the opportunities for certain aspects of environmentally sustainable development by considering some aspects of the evolution of environmental management in Vietnam. Secondary objectives are: (1) to identify specific issues in the policy formulation and implementation process that contribute to the first objective; (2) to consider the environmental policy experience of other transitional economies, specifically those in Eastern Europe and the former Soviet Union, in light of similar economic and potential political reform in Vietnam; (3) to explore the existence and role of environmental initiatives within civil society in Vietnam and the nature of the political influence these have on policy.

To address these issues the following research questions are posed:

1. Vietnam is in a state of transition from a centrally planned to a mixed economy. Although this change has been predominantly economic there are examples of an embryonic environmental movement in Vietnam. What similarities does this movement have to the environmental movements in Eastern Europe and the former Soviet Union in the late 1980s and early 1990s? What environmental protest experience in the region can contribute to an understanding of the situation in Vietnam?

2. Although Vietnam has a stated policy goal of improving the prospect for more sustainable development, as documented in the National Plan for Environment and Sustainable Development (NPESD), does the current policy formulating structure provide a barrier to or opportunity for a more sustainable development pattern?

3. The economic reform policy of *Đổi Mới* introduced in 1987 in Vietnam is principally a policy of economic liberalisation, therefore, assessment of some economic aspects of the

discourse on SD is relevant. The impact of an increasingly unregulated market raises a number of issues which are considered in this thesis, including the appropriate valuation of environmental goods and services, the existence of externalities and the privatisation of environmental services. Therefore, what impact does the renovation of the Vietnamese economy under *Đổi Mới* have on prospects for sustainable development ? Is the policy of *Đổi Mới* causing poor ecological outcomes because of '[N]ew pressures on the resource base brought by trade liberalisation, the growing economy and industrialisation [which] are superimposing upon the environmental consequences of a long war and a continuing tight fiscal situation' ? (UNDP 1994: 3)

4. What sustainable agricultural development models would improve Vietnam's opportunities for a more sustainable development and reduce the barriers to achieving such an outcome? What are the productive practices in Vietnam which have a very low environmental impact and therefore a high potential for environmental sustainability?

5. Does the importation of environmental policy ideas contribute to, or detract from prospects for sustainability?

1.5 Chapter Summaries

Chapter One provides an introduction to, and the context of, the thesis and includes the objectives and specific research questions.

Chapter Two describes the theoretical framework and assumptions, and considers aspects of the literature relevant to the research questions. This chapter explores the issues raised in the literature about Vietnam's current socio-economic transition and what impact this has on prospects for SD. This chapter also considers the theoretical underpinning's of the view

that certain forms of agricultural development and wastewater treatment are more likely to achieve a higher degree of ecological sustainability.

Chapter Three describes the methodology, data gathering and analytical methods used in the research.

Chapter Four considers the experience of the environment/development nexus that has developed into civil society initiatives in the former socialist countries of Eastern Europe and the former Soviet Union. These various historical experiences can shed light on the potential for influence of the growing concern for the environment and whether this contributes to improving the prospect for SD in Vietnam. The chapter also explores some aspects of civil society in Vietnam in light of the potential impact this may have on policy formulation and implementation. This chapter makes the case that an embryonic environmental movement is active in Vietnam. The evidence presented includes the activity of certain environmental organisations and a case study of an environmental protest action which directly led to a change in government policy. Common themes identified in the sections on environmentalism in Eastern Europe, the former Soviet Union and Thailand are considered in light of the experience in Vietnam.

Chapter Five outlines the environmental policy of Vietnam and analyses aspects of its formulation and implementation in terms of ecological sustainability. A number of weaknesses are considered including the effects on policy success from the importation of policy ideas from outside Vietnam. Also the problem of restricted information flow and very low inter-agency cooperation is presented as an argument that these cultural factors will limit the success of the national SD strategy.

Chapter Six describes the case of water re-use in the district of Thanh Trì, focussing particularly on the physical, economic and technical aspects. This chapter also explores the wastewater re-use issue from a socio-economic perspective. The impact on the health of residents and workers in Thanh Trì is examined in light of this perspective.

Chapter Seven readdresses the research questions in terms of the analytical framework and the discussion in chapters 4-6 and draws conclusions.

Chapter Two

Review of Relevant Literature

2.1 Introduction

In this chapter the literature relevant to the objectives outlined in chapter one is identified and explored. The literature on the transitionary period in Vietnam, is described, focussing particularly on those aspects relevant to this study, such as the impact of the most recent land reform process. Also in this chapter the various theories that explain the development, or re-emergence, of a civil society are investigated. The role of the state is considered in terms of the legitimation of policy and law, all of which are crucial issues in terms of the enforcement of Vietnam's national environmental law. The nature of science and technology policy in contemporary Vietnam and the ramifications for environmental management are explored. The literature regarding the prospects for SD in Vietnam is examined in detail.

The background and general principals of sustainable agricultural production are considered as a foundation for achieving a 'very sustainable approach' to agricultural development that may be more readily implemented in Vietnam. The literature on aspects of wastewater re-use and treatment is reviewed with a view to the applicability of such concepts to Vietnam. These issues are considered because they are central to the case study of wastewater re-use in the district of Thanh Trì.

2.2 Vietnam in Transition: Issues that relate to SD

There are certain aspects of the transitionary period that are particularly relevant to the context of SD in Vietnam. Since the reforms of the late eighties, changes in the nature of agricultural production, the policy and regulatory environment, and the role of civil society and environmentalism have occurred and are all crucial to the prospects for enhanced SD in

Vietnam. The transitional period has attracted a great deal of analysis. It is appropriate, therefore, to review the literature on the impact of reforms on agricultural policy and practice, civil society and the role of science and technology policy on the environment. The following section compares the relevance of some aspects of the literature to this case study.

2.2.1 Issues of Land Reform and SD

In this section the relationship, both positive and negative, between land reform in Vietnam and the prospects for highly sustainable models of agricultural development and food production are considered.

In 1988, Resolution No. 10 (*khóan hộ* or *khóan mươi*) extended the limited land tenure, established under Directive 100, to 15-20 years and transferred a great deal of control of production to the peasant households which has allowed a far greater sense of permanence and investment incentive to develop (Lê Cao Đoan 1995: 118). Agricultural productivity has risen generally and the subsequent increased income has led to spending on goods and services beyond the needs of recurrent farm investment. One of the environmental impacts of these reforms has been to fragment control of land, as it is now divided into family plots. Any notion of centralised agricultural planning, in terms of the choice of crops grown in any given area, is more complicated, but is far more locally orientated which provides an opportunity for communities and villagers to determine a cropping regime that may be more appropriate for their local conditions. This is consistent with the non-hierarchical SD models of, for example, Bookchin (1980, 1982, 1989).

The new policy means that there is a greater incentive to increase the productivity of the soil. This, in turn, has led to a continuing dependence on chemicals. According to Lê and Rambo (1993), the productive capacity of the soil in the Red River delta is approaching or

has reached its peak and this, coupled with various other factors, will reduce substantially the rice-growing capacity over time. A general agricultural trend throughout 1993 was a move towards cash crops which could indicate a growing dependence on cash generation and less on subsistence production. All areas 'showed an increase in the short term cash crops' (Fforde 1993b : 71).

Lê and Rambo (1993) suggest the main impact may be from cash cropping. One of the consequences of Resolution 10, or the so-called 'household contract' system, may be that farmers plant higher return cash crops and no rice. Lê and Rambo (1993) also point out the ecological cost of diminished bio-diversity and the additional burden of agro-chemicals. These two factors tend to reduce the sustainability of agricultural ecosystems and are, therefore, contrary to any ecologically sound agricultural production model. This is part of the impact of an increasingly free market, which fails to include the externalities of environmental degradation.

Lê Cao Đoan (1995) argues from an ideological perspective that the 'new land reform' under Resolution 10 has been a retrograde step which partially betrays the goals of the revolution. Đoan suggests that the potential surplus is continuing to be eroded by the state in the guise of the former cooperatives which are now acting as agricultural service providers. Đoan proposes that the entire contract and collective economy be abolished and 'replaced by a system of cooperation among individual autonomous peasant households' (Lê Cao Đoan 1995: 124). Such a view is consistent with Bookchin's anarchic productive arrangements.

2.2.2 Civil Society

This section discusses the various themes in the literature on civil society in the former socialist states of Eastern Europe, the USSR and contemporary Vietnam and how these are

relevant to prospects for increases in SD. A central notion of a social ecology model of sustainable development is the control of resources by communities. The environment provides both resources, as the basis of most productive processes, and also the sink into which society pours its waste. The SD models that aim for maximum social justice and political freedom require that these two functions of the environment be controlled by the people who may be affected. Therefore local control of the environment is an ideal SD goal. Vietnam has a high degree of state control, although it is argued that traditionally local control which is independent of both state and party has not disappeared.

In the Gramscian form, civil society 'was envisaged as a realm of free social and cultural space to be carved out of the all-encompassing matrix of the totalitarian communist Party-State by conscious intellectual and social action' (Miller 1992: 5-6). The principle of this notion is that the social sphere would simultaneously be autonomous from the State while not challenging the legitimacy of it. This notion appealed to Euro-communists in the late seventies and early eighties as they 'searched for more palatable alternatives to Soviet "real socialism"' (Miller 1992: 5). Indeed, activity within the social sphere 'obtained its status through a tacit social contract with the authorities of the ruling party-state' and yet this 'sphere' is also 'where the dominated social groups may organise their opposition and where an alternative hegemony may be constructed' (Miller 1992: 5).

Miller suggests that the Euro-communists found Gramsci's theory appealing because it allowed for a situation where an 'opposition movement [could] operate within a strong, modern state, which it had almost no prospect of overcoming' (Miller 1992: 6). The potential for applying such a theoretical perspective to Vietnam is that in the Gramscian vision there must be some associations, such as the Church or the trade union movement, that have not been completely 'penetrated by the political society' (Miller 1992: 6). In Vietnam such 'associations' may also grow around environmental goals. The issue of what

delineates civil society from the state is important in the case of Vietnam. Tester (1992) defines the separation of civil society and the state as:

> [A]ll those social relationships which involve the voluntary association and participation of individuals acting in their private capacities in a simple and perhaps even simplistic formula, civil society can be said to equal the milieu of private contractual relationships. It is the coming together of private individuals, an edifice of those who are otherwise strange to one another' and further, '[A]s such, civil society is clearly distinct from the state. It involves all those relationships which go beyond the purely familial and yet are not of the state (Tester 1992: 8).

There may be parallels between the Chinese notion of *minjian*, or literally the realm of the people and such a notion of civil society. Yang (1994) compares the operation of the *minjian* to that of the 'second society' in the formerly socialist Hungary described by Hankiss (1990), which operated 'in-itself' but not 'for-itself' meaning that while this social phenomenon was outside the state it 'did not consciously form a separate and independent civil society' (Yang 1994: 288). Hankiss wrote that these did not represent two different people but 'two dimensions of social existence', between which people move, as necessary, from one to the other (Hankiss 1990).

There are a number of views expressed in the literature about the nature of state/societal relations in Vietnam. The first, and most common, is the view of Vietnam described by Womack as a 'vast and coordinated party-state which pre-empts alternative and autonomous societal organisations from the national centre down to the grassroots' (1992: 180). Also it is 'mono-organisational socialism, [within which] there is little scope for the organisation of activity independent of the party-led command structures' (Thayer 1992: 111-12) and that effectively all power to formulate policy rests within the Party/State (Porter 1993: 101). This view is, perhaps, the least subtle of the generalisations. If this were the case, it is claimed, the result of such a bureaucratic structure on policy is that 'social forces have no significant impact' (Tria Kerkvliet 1995: 399). Thus, according to

this view, civil society would not be able to emerge. However the 'emergence and continued existence of non-political associations and groups, formed in response to economic change, and as a result of local initiative, cannot easily be reconciled with the mono-organizational model' (Thayer 1995: 52). There must be a more appropriate theory to explain the new civil activity in Vietnam.

An alternative view is that which ascribes less power to the state than the above types (Tria Kerkvliet 1995: 398-400). In this type the state is not 'strong' enough, in terms of resources, to be able to fully implement programs. For example, the very existence of a black or informal market, when it was not part of the state-led economic 'system', proves this point. Likewise, the ability of local communities to inhibit the implementation of various unpopular policy initiatives since the revolution demonstrates the lack of total authoritarianism. A more sophisticated view would suggest that grassroots influence of the state's direction is possible, but only through sanctioned channels such as mass organisations, like the writers' unions and organisations such as the conservation association. The degree of influence is not necessarily institutionalised beyond the protocol of review that exists. It may have always been prudent not to oppose the government/party overtly, but to slow implementation or ignore directives where possible, and which represents the actions of a more covert civil society. Therefore, while the legitimacy of the party could remain unchallenged the policy direction of the government is still open to civil interpretation. Further evidence is the phenomenon of authorities defaulting to local custom rather than to the state policy in disputes over land allocation. As Gillespie has observed 'a rational rights-based legal system is unfamiliar to most people' in Vietnam (Gillespie 1994: 4).

2.2.3 Local Autonomy

The traditional Vietnamese political culture of local autonomy is supported by the frequently quoted saying "the law of the sovereign gives way before the customs of the Village" (*Phép vua thua lệ làng*). This tradition of local autonomy is consistent with the political aspect of anarcho-syndicalism espoused by Kropotkin (1909), Pepper (1993) and Bookchin (1989) and is thought to be the most ecologically sustainable macro-economic production/consumption unit.

Although the tradition of local autonomy may have been eroded after the revolution, some commentators, for example, Marr suggest that the local authorities have 'managed to expand their political space in recent years' (1994: 7), or to reject central authority overtly (Gillespie 1994)[1]. It has been suggested that the most significant aspect of the Sixth Party Congress was its formal commitment to democratisation of Vietnamese politics, '[F]or the first time there was widespread refusal to accept the absolute authority of the leadership' (Thayer 1991b). *Đòi Mói* was introduced to renovate aspects of Vietnam's economic and political system, although the political reforms aimed to improve the efficiency of government by streamlining the bureaucracy rather than provide fundamental political change. The Vietnam Communist Party (VCP) advocated a 'broadening [of] democracy and reaching a consensus through debate', but not through the application of pluralism (Porter 1990: 86). The three "No" declarations of 1989 clearly identified the limits of reform: 'No[2] calling into question the leadership of the VCP, no calling into question the one-party state, and no pluralism, or multi-party democracy' (Schellhorn 1992: 240). Nevertheless, ordinary Vietnamese people are organising their lives more and more

[1]Gillespie notes that such traditional resistance to central control has, at times, manifested itself as civil disobedience. He cites the village in Hà Nam Ninh province where the village sacked the state officials and 'established their own defacto government' (Gillespie 1994 after Tria Kerkvliet unpublished 1993).

[2]Underlined in the original.

without reference to the party, indicating a re-emergence of the tradition of local control in Vietnam. Consecutive historical states of Vietnamese governance have never exercised such complete control of the people as similar authoritarian regimes elsewhere, and although the subjugation of the people has a long history in Vietnam, so too has the people's reaction to it (Marr 1991: 2).

It is suggested that during the transitionary period a devolution of power has occurred and the district level governments in Vietnam have filled the regulatory vacuum (Gillespie 1994: 10). '[T]he state has largely withdrawn from rural areas, leaving behind a vacuum in terms of extension services, access to improved technology, [and] access to rural credit' (de Vylder 1995: 47). Fforde (1993b) suggests that 'the rural population is increasingly manoeuvring to by-pass, rather than confront these obstacles', and further, that instead of the traditional cooperative structure 'farmers [now] get together in a multitude of ways' (Fforde 1993b). In terms of the potential for civil society, Fforde identifies some of the ways that farmers are organising themselves by replacing the State activities of 'credit, extension work, materials and service supply, [and] product marketing' (Fforde 1993b: 61)[3]. If, as Fforde suggests, the 'political space' being filled by autonomous rural organisations is denying the local party elite a power base and such developments do not appear to be opposed by the central government then the ultimate outcome will be interesting indeed. This decentralisation of power also has broader implications for the prospects of SD from a mainstream policy perspective. This will have a serious negative impact on the prospect for the universal introduction of family-based complex agro-

[3]Some authors have suggested that in China some of the 'new social actors' are examples of adaptation through opposition, by 'supporting existing state institutions on the behavioural level, [while] at the same time taking advantage of them and displacing [them] by trying to achieve private gaols at the expense of official ones'.(Kelly and He 1992: 29) The Party has always infiltrated and continues to infiltrate all organisations, but following on a the notion suggested by Kelly and He (1992: 30) 'this process is becoming mutual. Society was beginning to infiltrate the Party.

forestry[4], which is an 'improved technology', at least in ecological terms, as it requires training through some system of extension service and it requires financial investment for tree and orchard planting and other capital. The following section considers some of these implications.

2.2.4 The Role of the State

The role of the state in terms of SD is predominantly the formulation and implementation of policy, although it is debatable to what degree the state should or can influence a sustainable outcome. In Vietnam, the role of the state is central in terms of policy making but is questionable in terms of implementation. Vietnam's environmental literature is universal in its acknowledgment of the role of the state as both regulator and monitor and this is reflected in World Bank literature such as the report Vietnam: Environmental Program and Policy Priorities for a Socialist Economy in Transition (World Bank 1995) which identifies the need for state intervention in terms of pollution regulation, inter-agency and inter-government cooperation and also the construction and management of major environmental infrastructure. There are many examples in Vietnam of the failure of national policy to be implemented at a local level. The market-socialist system in Vietnam is rife with new and difficult policy tensions. Beresford and Fraser believe that 'one side-effect of decentralisation of decision making in socialist economies which retain a large amount of direct political power over resource allocation, is the relative autonomy of regional bureaucracies and the resulting unimplementability of central government decisions' (1994: 14). In Vietnam the Ministry of Science, Technology and the Environment (MOSTE) and the provincial Departments of Science, Technology and Environment (DOSTE) and Environment Committees (EC) are the central environmental

[4]Also known as 'permaculture' was first coined by Bill Mollison and others in the late 1970s to describe a combination of horticultural techniques that were ecologically friendly and rejected the use of chemicals and many other mainstream methods. The indigenous Vietnamese system of VAC is similar.

management authorities. Like most government authorities the degree of actual control these authorities have is questionable. The reformist SD position would conclude that this will lead to less control of environmental policy implementation (see chapter five foe discussion of the government's SD strategy). The radical anarchic position would describe such development as an opportunity for greater local control of the economy and the environment.

Nguyễn Trong Chuan (1992) believes that while the State has been responsible for the pollution and environmental degradation, the State is the most appropriate institution to enact and enforce environmental regulation. Indeed, Nguyễn Trong Chuan expresses concern that the trend toward decentralisation is potentially disastrous because the local authorities cannot be trusted to act in a sound environmental way. His solution is a more powerful technocracy with greater legislative powers to enforce a better environment. Eco-socialists in Vietnam maintain that a strong state is necessary for strategic planning which will improve sustainability. The current trend toward fragmentation and increasing independence is perceived by the social ecologists as counterproductive to an environmental solution rather than as an opportunity for community based, indigenous VAC type highly sustainable initiatives (Mai Đình Yên, Interview 1 October 1992),

Likewise, in support of the notion that devolution of power is environmentally counterproductive, Kos (1989) wrote of the former Yugoslavia, '[I]n this respect socialist countries should have "comparative advantages" since the strategy necessary to solve the ecological questions largely depends on strong coordinating institutions' (1989: 4). This illustrates a central dilemma. On the one hand, a strong State enforcing a sound regulatory structure is supported in the reformist, light green literature as being necessary for more sustainable development, but on the other hand, positions that have evolved from the 'small is beautiful' and anarchic traditions tend to reject centralised planning, either for

ideological reasons, (for example Bookchin 1980 as a libertarian or Moran et al. 1991 as economic rationalists) or because of the abysmal environmental performance of central planning to avert environmental disaster in the past (eg, Jacobs 1993; Merchant 1992). According to a strongly sustainable position, the State should devolve environmental monitoring and regulation to local authorities as soon as possible. While supporters of a bureaucratic environmental policy model warn of dangers in weakening national environmental goals, the devolution of environmental monitoring can achieve very sound environmental outcomes for various reasons described above.

For Kos (1989), the principle limitation in the formerly socialist Yugoslavia, was a lack of investment above and beyond everyday economic reproduction. While a strong State can facilitate some aspects of an SD strategy from a policy implementation perspective, the anarchic SD position does not support this and is naturally critical of State based systems. Beresford and Fraser, who support the eco-socialist position, suggest that 'both the new system and the old have advantages and disadvantages from the point of view of environmental protection. On balance, however, they 'conclude that greater possibilities for environmental protection combined with economic growth and a rising standard of living are offered by a reformed socialist system' (Beresford and Fraser 1994: 3).

Beresford and Fraser's (1994) view may be applicable if Vietnam were not principally interested in economic growth, even when there are measurable environmental and social costs associated with such growth. Therefore, the strength of the State can be important, but only when the goals of the State are consistent with SD. Otherwise a strong state can be a barrier, not an opportunity. In terms of how a strategy of greater sustainability might be achieved, the notion of a stronger State as the principle formulating and implementing institution is not uncommon. Nguyễn Trong Chuan (1992), for example, asserts the need for increased central planning and appropriate land use and monitoring. He adds that the

State should be responsible for an appropriate energy policy by providing fuel to rural families and, thereby, reducing the pressure on forests from fire wood collection (Nguyễn Trong Chuan 1992: 4).

There are many examples in Vietnam of government policy that has led to unforeseen socio-environmental outcomes. The policy of internal migration from the densely populated delta regions to the highlands after 1975 lead to two million *Kinh* (Vietnamese ethnic majority) settling in the 'new economic zones' in the highlands with consequent deforestation (SRV 1992b: 41). The government encouraged the clearance of land in the highlands as a 'model' activity and this caused a great deal of soil erosion (Beresford and Fraser 1994: 6). A number of poor environmental outcomes have resulted from the construction of the Bai Bung paper mill. First, the demand for raw material led to the opportunity for 'illegal timber getting' to supply the paper mill which is a failure of the central planning system to adequately allow for the resource needs of the mill (Beresford and Fraser 1994: 12). The paper mill created a demand for timber that invariably contributed to soil erosion within the catchment. Second, the water pollution caused by the mill pours untreated into the Red River upstream of Hanoi. It therefore enters the most agriculturally productive and densely populated parts of the Red River delta (Trần Yem Interview, 3 October 1992). The full impact of this pollution has not been assessed. The migration of *Kinh* to the uplands and the building of the paper mill were, in terms of environmental management, 'unsustainable' policy decisions.

Local environmental analysis focuses on two principal outcomes of policy failures; the rapid deforestation and the pollution caused by particularly 'dirty' heavy industries (Nguyễn Trong Chuan 1992: 2). The issue of deforestation dominated the global environmental literature and agendas throughout the 1980's. The increasing interest in

deforestation of the tropical areas of the world and its links with climate change has added great emphasis to criticism of the current development direction of forestry in Vietnam.

2.2.5 Legitimation

The concept of legitimation 'from the top' is the process of self-legitimation by the ruling regime 'when they believe their right to rule needs no popular verification' (di Palma 1991). In the case of the VCP, it has been suggested that they 'have a high level of legitimacy earned during its decades of independence struggle,' which has provided the VCP with 'a certain amount of freedom to pursue its traditional goals' (Joiner 1990: 1064, Beresford 1993: 218). Soviet-like bureaucracies (the Party in particular) 'lay claim to a command role because their tasks are guided by a superior [ideological] truth' (di Palma 1991). They, therefore, claim a monopoly on political discourse. The people must, according to this model, 'learn and disseminate [the truth]' (di Palma 1991). When policy comes from the top, the decisive operative relationship is not between rulers and people, but between rulers and Weber's[5] 'administrative staff' (in Gillespie 1994), or the Party cadres, who act as the policy implementors (di Palma 1991)[6]. The Party line must be in the form of policies and directives that the state apparatus can implement.

The process of legitimation is important with regard to the prospects of improved SD and 'reveals how the belief in one's normative legitimacy, a central feature of communist regimes, tended to trap the regimes in a potentially dangerous denial of increasingly demanding domestic and global realities' (di Palma 1991). One of the main

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[5]Gillespie (1994) notes that the problem with Weber's definition is that it considers bureaucracy as neutral in terms of its effect on state policy which is not the case in Vietnam.

[6]Tria Kerkvliet (1995: 401) states that this often results in a conflict of interest on the part of the local cadre who have strong familial ties to the village or community and may favour the local interests, resulting in deliberately slow implementation of policy or even completely ignoring an unfavourable policy.

recommendations of the NPESD was development and promulgation of a national environmental law. The literature on law in Vietnam focuses on the problems of the implementation of law in general. The notion of law in Vietnam 'is not so much that of an immutable order to which all should bow, but rather that of an important element of the way in which the Party Line is implemented' (Fforde 1986: 62). Therefore, for the Party Line to be realised, the State must act as an intermediary, 'as an entity separate from the party' (Fforde 1986: 62). But ultimately the Party 'Line' cannot be realised as '[N]o ideal can be perfectly put into practice' (Fforde 1986: 63).

2.2.6 Rationality and Epistemology: Some Philosophical Aspects of Science, Technology and Environmental Policy

The main issue affecting the impact of science and technology policy on SD in Vietnam is the philosophical underpinning of policy itself and the nature of its formulation. This is a complex issue and little work has been done on it in Vietnam. It is very important, however, to prospects for SD in Vietnam because it is, in part, connected to the issue of legitimation, discussed above. The state in Vietnam has entwined the notions of scientific rationality and the legitimacy of the state to provide policy credibility. To an extent this is typical of technocracies in most countries. However in Vietnam the rationality rhetoric is grounded in the revolutionary legitimacy of Marxism-Leninism. Also, this notion of 'rationality', which has been observed in China, has a more recent historical precedent as 'science policy in China and Vietnam was steered by a kind of scientific faith, largely imported from Soviet Union' (Jamison and Baark 1995: 270).

Faith in the rationality of science in Vietnam's policy community has a fundamental philosophical implication for prospects for SD. According to radical SD theory the most sustainable and environmentally benign strategies require revolutionary change to avoid pending ecological disaster, while the mainstream positions argue that varying degrees of

reform are sufficient. The degree of participation in environmental recovery or actions leading to SD depends on various economic, political and epistemological aspects (Redclift 1984). In Vietnam there is a strong faith in the scientific Marxian epistemology among the policy makers, which is reflected in the rhetoric of government policy statements, and importantly, this is also consistent with the hegemonic development model based on supposed rationality.

There has been an ideological crisis in Vietnam caused partly by the changes in the Soviet Union and Eastern Europe. Nguyễn Duy Quý, Chair of the Vietnam National Centre for Social Sciences (NCSS) wrote 'The collapse of the socialist system in the Soviet Union and Eastern Europe together with the complex developments of the world situation in recent years are raising a series of problems on the theoretical and ideological front which we must solve' (Nguyễn Duy Quý [7] 1992: 10). He believes the solutions will come from the 'pushing forward [of] social sciences research, the study of theory in order to supply scientific and practical facts for the cause of socialist construction in Vietnam in the new conditions of the age' (Nguyễn Duy Quý 1992: 11). The quotation below illustrates that the role of science in Vietnamese political culture and theory as central to the policy formulation process.

> Science has the main task of serving the society by [providing] theoretical knowledge and theoretical studies, to meet the requirements of the economic, cultural and social development, material production, technical progress and the requirement of the man (sic) himself in the capacity as subject of the activity (Professor Nguyễn Duy Quý, Chair of the NCSS in Vietnam Social Sciences 1992, Vol 2: 10-17).

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[7] In May 1991, the Secretariat of the Vietnam Communist Party's Central Committee convened a conference on the issue of ideological crisis in world socialism. Vietnam Social Science Journal asked Dr. Nguyễn Duy Quý, the Chair of Vietnamese National Centre for Social Science to review the 'theoretical' issues before the Political Bureau.

In Vietnam, the scientific legitimation of policy is both inherent in the technocratic approach to government and central to the theory of rational/comprehensive policy making. The NCSS, the umbrella organisation of the peak social research institutes in Vietnam, reinforces the concept of 'theory' as the core guiding principle behind social development, or at least planned social development. The Chair of the NCSS reiterates Lenin's thought that 'without revolutionary theory there is no revolutionary movement' (Nguyễn Duy Quý 1992: 11). He adds that 'scientific' theory as well as 'revolutionary theory' is required to meet Vietnam's development goals. The Vice-President of the National Centre for Social Sciences and Editor-in-Chief of Vietnam Social Sciences, Phạm Xuân Nam, describes the formulation of *Đổi Mới* as an example of a rational and comprehensive model, although it is apparent that the policy has developed, and continues to develop incrementally (Phạm Xuân Nam, Interview 18 September 1992).

The impact of rationality on environment policy is that it incorporates the notion of scientific optimism. This notion assumes that new technologies will always be socially beneficial and environmentally benign. If there were negative impacts these will be mitigated by further technological innovation. For example, the scientifically optimistic view would be that the nuclear power industry should continue to grow because, despite the problems of radioactive waste storage and the enormous expense of decommissioning old power stations, a technological fix will be developed in time. Scientific optimism is clearly evident in Vietnam.

A central requirement of a strongly sustainable development model is for peasants to be empowered toward improved environmental security. It is vital that policy allows for local epistemology as the basis for local solutions, as this will result in greater success when implemented. The World Commission on Environment and Development Report (WCED 1987), the basis of western mainstream environmental management, has failed to recognise

the importance of this because it has 'emphasised the scientific knowledge of the West over indigenous forms of knowledge' (Merchant 1992: 229). The WCED is inappropriate for non-western cultures and has also failed to account for the benefits of utilising local knowledge, and this notion reinforces the top-down, Western, mainstream nature of the report and the process it represents. In contrast, the multilateral organisations, such as the UNEP and the UNDP, have recognised the importance of local epistemology, at least in theory, as they now claim to support the notion of grassroots involvement in programs. The UNDP, for example, states as one of its goals, the promotion of 'capacity building in civil society, grassroots development, participatory approaches and the empowerment of people, and to work in partnership with NGO's and Community Based Organisations [CBO's]' (UNDP 1994 appendix ii). Such initiatives can support the formulation of relevant and achievable ecological goals by utilising the epistemology of the local community about their own environment and therefore leading to greater SD.

The importance of 'science' to policy development is at the heart of the technocratic policy process in Vietnam and contributes to the barriers to SD. To imply that environmental problems have a scientifically discoverable cause denies the role that the broader socio-political system plays in environmental degradation. Director of the Institute of Philosophy, Nguyễn Trong Chuan (1992) stresses the role of a 'proper scientific conception' with regard to the relationship between the environment and development. Also that in order to 'infiltrate peoples' minds' or have 'sufficient credibility', policy must be based on, 'up to date science and technology' (Nguyễn Trong Chuan 1992: 3). This notion is a crucial aspect of one of the central barriers to Vietnam realising an environmentally sound development opportunity. The technocratic obsession will obliterate the most ecological low technology approaches to agricultural and urban development because the methods lack a high technology appearance. On the whole Vietnamese technocrats need to consider the bigger picture which must include social responsibility,

recognising the value of low technology solutions and respecting the value of local untrained experience (Rawlings and Ruchel 1992). The question of legitimation of state policy on science and technology is also relevant to prospects for SD.

2.2.7 The Environment and SD in Vietnam

There is not a great deal of research on the prospects for SD in Vietnam nor on the various issues involved. During the late 1980s and early 1990s, however, a number of conferences and workshops in Vietnam were held examining various aspects of the environment and the impacts of development, particularly deforestation, pollution and loss of biodiversity. Despite the large number of papers presented at these conferences most focussed on technical information and only a small number addressed systemic causes or the need for revolutionary and integrated solutions. The material presented at the 'National Seminar on Environment Protection and Sustainable Development Research' held in October 1993, for example, had little on the integration of issues necessary for sustainable development. Most papers presented were scientific and technocratic. The topics covered included environmental monitoring, which concentrated on chemical and biological analysis, and environmental engineering, which discussed pollution problems specific to particular industries with end-of-pipe type solutions, not clean technology or zero emission solutions. Papers on ecosystem management considered aspects of natural environment conservancy but not with any social dimension. The exception at the conference was the paper by Lê Trọng Cuc (SRV 1993) of the Centre for Resource and Environmental Studies at the University of Hanoi on the potential for a system of integrated whole farm management or permaculture to replace swidden agriculture in the highlands. Earlier Trần An Phong (1990) considered the application of the concept to the various ecological regions of the Mekong. The concept is known as VAC [*Vườn, Ao, Chăn nuôi*, or Garden, Pond and Livestock] and has very promising potential for far more ecologically sustainable agriculture than currently exists. Major and comprehensive reports on the environment in

Vietnam during this period include the 1992 National Plan for the Environment and Sustainable Development to the Year 2000 (NPESD) published by the government of Vietnam in collaboration with various multilateral organisations and the World Bank's 1995 report Vietnam: Environmental Program and Policy Priorities for a Socialist Economy in Transition. This report is comprehensive but largely based on the work of local researchers and concluded that stronger government regulation will be necessary to alleviate environmental degradation. The report notes for example, that unlike North America and Western Europe polluters in Vietnam are not forced by regulation to pay. The report suggested that such a policy mechanism should be applied in Vietnam with no regard to the practical difficulties of such a strategy given Vietnam's legislative framework. The dominant weakness of the report is the recommendation for inappropriate Western pollution reduction methodology and policy mechanisms in contemporary Vietnamese circumstances. The World Bank report suggests also that farmers must be encouraged to invest in sustainable agricultural practices in order to reduce their dependence on fertilisers and improve the economic viability of household level farming. The report fails to recognise the extraordinary difficulties faced by farmers who rarely create a surplus that could be reinvested beyond next seasons basic seed requirements. In terms of industrial pollution the World Bank report (1995) recommends the application of clean technology in new industries, suggesting that the government could use the licensing of new investments as the mechanism for intervention. The relevant sections of the NPESD are analysed in full in chapter five of this thesis.

Lê and Rambo (1993) refer briefly to the untreated wastewater which is generated in Hanoi and used by the residents of Thanh Trì, but they do not expand on the human ecology of the relationship. Importantly though the authors' three central concerns about the human ecology in the deltas are the loss of bio diversity from rice or other cash crop monoculture, the loss of long term soil fertility because of the increasing dependence on fertiliser, and

linked to the last point, the protection of crops from pests, with the current overuse of chemical pesticides (Lê and Rambo 1993: 24).

The literature on sustainable agricultural development in Vietnam, which includes the work of Lê and Rambo (1993), Trương (1992) and Mai Đình Yên (1992), considers the issue of adapting agroforestry models to the various and unique climatic and soil type conditions throughout rural Vietnam. Mai (1992) has explored the concepts of peri-urban boundary development, particularly in Hanoi (see chapter 6). The potential for a environmentally sound and energy efficient wastewater treatment in Hanoi has likewise been raised by Lê Minh Châu, Director of the Hanoi Sewage and Drainage Company, who wrote that a system of 'wastewater treatment could bring cleaner production effects such as [a] combination of wastewater treatment and fishery [production], [and] energy recovery, [in the form of] protein recovery' (Lê Minh Châu 1990: 1).

2.3 Sustainable Agricultural Production

This section describes the historical and theoretical underpinning of sustainable agricultural production. In the late 19th century, Russian geographer and anarchist Kropotkin (1968) wrote of an ideal agricultural development that avoided monoculture and the use of chemicals. He proposed a model based on increasing diversity, for both agriculture and labour[8]. As a precursor to the modern sustainable agriculture movement, Kropotkin argued against the late 19th century trend of reducing areas of land under cultivation. In answer to the Malthusian thesis on over-population as a limit to development, Kropotkin proposed instead that the appropriate intensification and diversification of agricultural production would offset population growth. For Kropotkin, radical change was required in the

[8]Kropotkin (1968: 134) was concerned about the psychological effect on workers of the increasing specialisation in industry and agricultural jobs. He proposed that the diversity of work was important to avoid the dehumanising effect of repetitious factory work. Maintaining diversity would give people the opportunity to work in many spheres of production.

political economy to achieve the goal of human welfare rather than a reduction in the number of people for which welfare was to be available (Kropotkin 1968).

The ideas of Kropotkin have their modern equivalent in the works of social ecologists such as Bookchin (1980) and Mollison and Holgren (1978). Social ecologists oppose[9], on principle, any neo-Malthusian notion of population control or restrictive migration. Instead, they support the view that structural problems in the world's economy generate shortages. Social ecologists propose a type of development that is based on ecological principles that fully utilise the resources available regardless of physical factors. Consistent with the theory of social ecology are smaller decentralised communities that use resources at sustainable rates and redistribute the means of fulfilling basic needs. A further requirement is that all communities have free access to the means to achieve self-sufficiency within their own regions or space. Bookchin describes an 'ecotopic' vision as:

> [when] the foregoing attempts to mesh ecological with anarchist principles are ever achieved in practice, [then] social life would yield a sensitive development of human and natural diversity, falling together into well-balanced, harmonious unity... Freed from an oppressive routine, from paralysing repressions and insecurities, from the burdens of toil and false needs, from the trammels of authority and irrational compulsion, the individual would finally be in a position, for the first time in history, to fully realise his(sic) potentialities as a member of the human community and the natural world (Bookchin 1980: 187).

A society that pursues specialisation, as is the case in Vietnam, is, according to a social ecological perspective, distancing itself from sustainability. The political dimension of social ecology is reflected in Bookchin's (1980) definition of a 'healthy society is a healthy ecosystem and humanity is just one part of it'. This becomes the theoretical rationale for the objective of meshing the ecological notion of a 'web of life' with an anarchic political concept of decentralised power and direct forms of democracy. Like an ecosystem,

[9]Mollison and Holgren (1978: 8) does suggest that under certain circumstances limiting populations will improve the effectiveness of alternative agricultural production systems.

diversity and interconnectedness are systemic features. The systemic features of global capitalism are the opposite, being on the whole, division and specialisation.

Commoner's (1972: 268) critique of the capitalist economic system was based on the inherent socio-environmental injustice that society 'as a whole bears the cost of the "externalities" of the production of synthetic products for private profit'. Of particular relevance to this case, is Commoner's focus on agribusiness and the environment. For example, while the use of artificial fertilisers is considered by the mainstream model to be essential for a competitive agricultural sector, Commoner wrote that

> under the impact of heavy use of inorganic nitrogenous fertilisers, the nitrogen-fixing bacteria originally living in the soil may not survive, or if they do, they may mutate into non-fixing forms...As a result, it will become increasingly difficult to give up the intensive use of fertiliser nitrogen, as this main source of natural nitrogen is lost. To the salesman(sic), nitrogen fertiliser is the "perfect" product - it wipes out the competition as it is used (Commoner 1972: 153).

The trends that were the basis of Commoner's concerns have not diminished over the last twenty-five years. Environmental degradation is now more widespread, and the problems directly related to food production have compounded, particularly, pollution and food contamination from agrochemicals, soil loss from poor catchment management and unnecessary tillage, and biodiversity loss caused by the pursuit of monoculture and the use of pesticides and herbicides. Recognition of the cause of these problems is not extensive, and the mainstream view is that more sophisticated technology will reduce them. Sustainable agricultural production methodologies have developed, for example agroforestry and permaculture, however, and these acknowledge the causes as largely structural. The human ecological positions, which promote the use of such food production methods, suggest that the political economy of the dominant agricultural paradigm tends to favour a certain form of production and institutional framework, and that this includes the

vested interests of agencies such as the government departments concerned with agriculture and the agrochemical industry. These agencies do not favour the integrated less dependent systems, because the less dependent agricultural methods tend to erode the power of government agencies and the profitability of industry.

In the densely populated delta regions of Vietnam, the ratio of arable land per capita is one of the lowest in the world. Agricultural production has been rising since the economic reforms, nevertheless, it is likely that productivity, using current agricultural technology, will fall behind supply as population growth rates and domestic demand increase (Winton and Brummit 1994: 125). Vietnam's national policy of increasing agricultural output is a priority, if however, this is done in an unsustainable way it will have a serious socio-environmental impact in the future. It will, to paraphrase Our Common Future, *compromise the ability of future generations to meet their own needs* (WCED 1987).

Most environmentally responsible alternative models of integrated food production, such as permaculture or agroforestry, aim to eliminate soil loss by permanent cropping of a great diversity of species and aim to eliminate the need for artificial fertilisers[10] by cycling nutrients through leguminous trees[11] (Mollison and Holgren 1978: 10). This leads to the progressive elimination of pesticides because insect predatory species are attracted to the new and complex forest and orchard habitat. In addition, a variety of trees can provide fruit, fuel, and building materials. These systems also propose the use of ponds for the

[10] The continued use of chemical fertiliser also impacts on the environment downstream, as field run-off containing the nitrogenous compounds leads to algal blooms and eutrophication. In addition, high nitrogen levels in surface waters can leach down to contaminate the groundwater. Degradation of downstream water quality from any cause will ultimately impact on human ecology.

[11] Leguminous plants have the ability to fix atmospheric nitrogen through nodes on their root systems. Leguminous plants, such as clover, peas, beans and acacia trees, therefore improve the soil productivity and can be planted between or around other productive species which when applied with other soil building techniques can alleviate the need for artificial fertiliser. The use of legumous trees as fodder plants is also recommended (World Bank 1995: 48)

production of fish and the treatment of waste such as manure. Bird (1988) makes the important distinction that such systems are clearly better able to serve the needs of a local community rather than an export market. Therefore, agroforestry programs occupy an important niche in ecologically sensitive, community-based development theory and practice (Nixon 1995: 18).

In Vietnam, farmers who continue to increase their use of agrochemicals to support cash cropping will become more dependent on chemical and seed supply companies, and the productivity of the soil will become dependent on artificial supplements. Broad acre monoculture and plantation agriculture is the least ecologically sustainable in terms of energy and chemical inputs and pollution outputs. Farmers are forced to seek maximum profit over the short term, so they have little choice but to follow a cash crop monocultural pattern. Such a pattern is in the commercial interest of agribusinesses who actively lobby relevant government departments and the farmers' organisations to support and encourage such a pattern of development. The protagonists of integrated farming methods, such as permaculture, reject such dependent relationships, demonstrating instead that small scale farmers can be profitable and self-sufficient in terms of nutrients and energy (Mollison 1993: 5). For these systems to be successful, a different culture of agricultural investment and development is required.

In conclusion, those models of agricultural development which pursue diversity, local participation and ecological efficiency are, therefore, more sustainable, when compared to the mainstream agricultural development trends. The mainstream or status quo model will, given the new pressures of the market and international trade liberalisation, compound the current situation in Vietnam, which is 'Very Weakly Sustainable'.

2.4 Wastewater: Pollution or Resource

Urban water problems in Asia fall within two contrasting, but linked, categories of problems, those caused by the underdevelopment of infrastructure and those caused by the process of ecologically unsound development practices (Low and Balamurugan 1991: 168). The goal of wastewater treatment, as opposed to wastewater disposal, is a relatively recent phenomenon. As concerns about environmental degradation have increased, the assumption that nature will continue to absorb the waste we produce is being challenged. Despite this attention, the bulk of wastewater produced in the world, that is the water that contains all domestic and industrial waste, gets little or no treatment before being released into the world's rivers and oceans. China, for example, releases 37 billion m^3 of sewage per year without treatment and more than 2000 treatment plants would be needed to address the problems caused by this quantity of sewage (Niemczynowicz 1994: 95). In order to meet all the water related infrastructure requirements of the developing world, an ongoing annual investment of USD 50 billion is required (Niemczynowicz 1994: 95). This estimate is based on the type of treatment technology that has 'evolved' in the West and is, therefore, unrealistic for developing countries[12]. Such technology has often developed in an ad hoc way and has become unnecessarily complicated and therefore expensive. Given the unrealistic investment levels required to recreate fully reticulated western treatment systems in the developing world, the application of 'radically novel, cost effective, ecologically sound and sustainable technologies' becomes desirable (Niemczynowicz 1994: 96).

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[12]I use the term 'evolved' deliberately because it is clear that wastewater management and the subsequent technologies that are used in the West have developed over the last one hundred years or so, and are not necessarily what would be designed if we were to start from scratch. Most so called developing countries are starting from scratch and therefore have the opportunity to apply conceptually innovative ideas, many of which may be based on traditional technology.

Anil Argawal, a senior adviser to the Indian National Government on environmental issues, notes that the concept of flushing toilets and mass sewage systems, as first conceived for India by Britain, is the most non-sensical technology ever invented (Trudgill 1990: 34). To provide the quantity of water necessary to flush all the toilets in India, if the flushing type were installed, Aragawal suggests that it would be necessary to dam up the Himilaya. Agarwal highlights one of the principal weaknesses of planners, in this case water resource planners, suggesting that the first principle should be a consideration of what we can do with the resources we have now, as long as the resources are recognised as such. Feachum et al (1978) suggests that '[T]hose whose job it is to select and design appropriate systems for the collection and treatment of sewage in developing countries, must bear in mind that European and North American practice does not represent the zenith of scientific achievement and nor is it the product of a logical and rational design process' (ibid 1978: Section 8: 4). Chapter five of this thesis explores the issues, both positive and negative, concerning the wastewater relationship between Hanoi and the District of Thanh Trì. It argues that the current situation could be the basis of a 'very strongly sustainable' wastewater treatment and food production system.

The goal of SD, in terms of wastewater, is to reduce the impact of pollution, ideally to zero, while fully utilising any nutrients or other recoverable materials. One of the central problems, in this case, is whether wastewater is defined as pollution or a resource, or more appropriately, containing elements of both. The question of utility and the definition of pollution is central to this thesis. As Low and Balamurugan (1991: 169) describe Southeast Asia in general, 'the river is a source of drinking water, a place for sewerage disposal, a mode of transportation, a recreational area, a source of food and, more often than not, a rubbish dump[13],' and further, 'that the major sources of water pollution in Southeast Asian

[13]According to the Vietnam Living Standards Survey 1992-1993, on average 8.8% of households dump their rubbish in a lake or river, in urban areas this ratio climbs to 13.23% (SRV 1994: 259).

cities are: sewerage effluent and untreated faecal matter: industrial effluent and untreated industrial wastes; domestic and industrial garbage; and sediment' (Low and Balamurugan 1991: 169). While the disutility of pollution is the negative impact on the human ecology downstream, it can also be one of utility, because of the profitable re-use of the polluted water as an organic, nutrient-rich resource.

If wastewater is only considered as pollution the natural response is to design systems to treat it. The literature on wastewater treatment tends to be concerned with the technical aspects of the treatment process. Broader policy and socio-environmental aspects have, to date, received little attention. The bulk of the literature is by engineers who have not, on the whole, been concerned with looking for simpler alternatives. For example, the literature is generally specific to engineering 'solutions' and not interdisciplinary. The language of engineering is maths and physics and this level of discourse is positivistic and generally unsympathetic to views that are less quantifiable. Historically the literature on wastewater treatment in the developing world (for example Ellis and Tang 1991) takes a technical perspective and fails to address the possibility of 'low technology' solutions.

More recently the recognition of the value of low technology solutions to urban water problems has become more mainstream. Agenda 21, the global strategy for SD, produced by the WCED and ratified at the 1992 Rio conference lists, as desirable, various activities relating to wastewater management to be carried out by each country, 'according to their capacity'. Particularly the '[P]romotion of the construction of treatment facilities for domestic sewage and industrial effluent and the development of appropriate technologies, taking into account sound traditional and indigenous practices' (WCED 1992). Furthermore, the strategy suggests the 'introduction of a precautionary approach in water-quality management, where appropriate, with the focus on pollution minimisation and prevention through the use of new technologies, products and process changes, pollution

reduction at source and effluent reuse, recycling and recovery, treatment and environmentally safe disposal' (ibid). An example of *sound traditional practice* as required by Agenda 21 (ibid) for Vietnam would be a combination of an artificial wetland, VAC type agriculture, and a lagoon-based treatment system (see chapter 6).

Some work has been done to prove that leaving wetlands intact and harvesting them, for water, fish and timber, is more economically viable than destroying them and changing the land use (Pearce et al, 1991)[14]. In addition a growing body of work on the creation of artificial wetlands for the purpose of urban run-off and sewage treatment has emerged (for example Mai 1992, Moshiri 1993). The basic premise of this concept is that using various methods of valuing the environmental benefits of wetlands, as well as those more readily recognisable to economists, such as the commercial value of harvest products, means that the value of wetlands can exceed the value of the land filled, drained and sold for property development. The value is further compounded over time as the benefits of the wetland, if left intact and managed sustainably, can continue to produce the original benefits *ad infinitum*. Chapter Six of this thesis explores the issues of whether it is possible for the urban and suburban pond and canal systems in Hanoi to be 'developed' into a combination of wetlands and green belts and managed on the basis of the principles of VAC and agroforestry.

[14]The University of Agriculture and Forestry in Thành Pho Hồ Chí Minh has some work on the utilisation of the natural river and marshes in the area, particularly the wetlands to the north west of the city. Here it has been proposed to encourage fish farming based on family controlled ponds dug into the marshes with the resulting soil used to protect the 1 hectare farms from floods. The author suggests that the cooperation of at least 10 families would be required in order to provide the initial labour to construct the pond/dyke system. The land is otherwise unproductive because it is regularly flooded. (Chan n.d.) It is ironic that such a system is designed as an answer to future development using VSS techniques while a similar system exists in Thanh Trì.

The literature describing the use of aquaculture as part of municipal wastewater treatment tends to focus on the utilisation of the wastewater as a nutrient resource. The potential for the application of various aquaculture technologies, used deliberately as treatment systems, developed more fully from the late seventies (Duffer and Moyer 1978 for example). The potential for low cost, low energy and low chemical input treatment is generally recognised but not implemented. It is clear from the literature that wastewater fed aquaculture is a highly efficient and ecological sustainable food production technique and should be pursued as long as the potential health impacts are mitigated against.

The use of organic waste in aquaculture can be divided into three distinct approaches (Polprasert 1989: 175). Firstly, the direct application of excreta and manure to ponds. This approach is very common throughout Asia. Overhanging latrines are used to routinely fertilise ponds or streams. In Indonesia bamboo fish cages built on passing streams are used as latrine platforms. This is similar to the approach used in the Vietnamese VAC model which requires the construction of a fish pond on each family farm, into which all the household, human and animal waste is thrown. Second, is the use of urban effluent to fertilise collective fish ponds, this is effectively the method used by the aquaculturists of Thanh Trì. Third, is the engineered approach of using the stabilisation ponds at a sewage treatment facility to grow fish, or fish food. This method is used in Germany, Israel and Hungary. Melbourne is experimenting with the use of the lagoons at Werribee to grow fish food, but not fish[15]. This last method does not apply to Thanh Trì because the ponds used by the farmers were constructed for the purpose of aquaculture not wastewater treatment, although they serve this purpose by default.

[15]The Victorian State Health (Australia) legislation regarding the re-use of wastewater is very strict and the standards are arguably too high for re-use schemes to make effective use of the available nutrients.

There are a number of basic principles behind waste-fed aquaculture which contribute to it qualifying as one of the most environmentally sound concepts in food production. The principle feature is that it provides the opportunity to combine waste stabilisation with a process of nutrient recycling. For instance, in a designed 'system', as opposed to an ad hoc situation, the owner of the system, for example a local sewage authority, may consciously build in fish production to offset the costs of water treatment. The potential impact of this economic 'feature' is also considered in chapter 5.

2.5 Conclusion

There are a number of aspects of the reforms in Vietnam that have either a positive or negative impact on prospects for a more ecologically sustainable and socially just development. Increased commercial pressure on farmers using orthodox chemically dependent techniques has exhausted the fertility of the soil. Industrial pollution continues largely unchecked by environmental law, and threatens the health of residents downstream. Changes in the political environment can be interpreted in different ways, for example the eco-socialists conclude that current trends will reduce SD potential because a strong state is apparently necessary to implement centralised environmental policy. On the other hand, increased local autonomy and reduced state credibility in terms of centralised policy is consistent with the anarchic models of SD. The historical tradition of village level, semi-autonomy in Vietnam is the principle most closely comparable to the theoretical anarcho-syndicalist position in the literature. The work on SD in Vietnam concludes that alternative agricultural methods such as VAC provide the most strongly sustainable option.

The following chapter describes the data collection and analytical methods used in this thesis.

Chapter Three

Methodology

3.1 Introduction

In this chapter the philosophical underpinnings of the methodology are outlined, and the data gathering and analytical methods are described. It is argued that the case study methodology used in this study is most appropriate. The scope of the study is defined including an explanation for the choice of the site. The data gathering techniques are described with reference to the circumstances in Vietnam that can make social research problematic. The key actor selection and interview procedure is discussed. This section also highlights the particular problems in the field and discusses adaptations that were necessary. In this chapter the household survey methods are described. Some of the methodological limitations which affected this study are described. Those questions from the household survey that provided useful data for the study are reprinted in Appendix B.

3.2 Type of Study

This is a policy case study using both qualitative and, for descriptive purposes, quantitative data. The study includes a qualitative review of relevant policy documents, qualitative analysis of a number of key-actor interviews and a survey of 60 households in the district of Thanh Trì. The specific methods used are described below in section 3.5. Consistent with a humanistic, subjective, meta-ethical position the methodology of this thesis is not designed to test any specific hypothesis or to reinforce a specific grand theory, instead the analytical methodology is described with reference to the notion of grounded theory, or the generation of theory *grounded* in the data and in reference to the specific questions posed in chapter One (Glaser and Strauss 1968).

Advocates of the case study method agree that it is 'the best way by which we can refine general theory and apply effective interventions in a complex situation' (Stoeker 1991: 23). Further, Stoeker after Platt describes the three rhetorical functions of the case study as basically, to help define abstract concepts, provide concrete illustrations of these concepts, and to assist the reader of the study to remember the issues because of the detail of the description (ibid). A 'technical' definition of a case study research strategy is 'an empirical inquiry that: investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used' (Yin 1989: 23). Given that case studies typically utilise qualitative data gathering and analytical methods, the issue of generalizability is expressed as the compromise between validity and reliability. The case study, like all qualitative research, aims for a high degree of validity with a lower but acceptable level of reliability.

The case study is appropriate for this investigation because of the complex and interdisciplinary nature of the phenomena. In order to describe, explore and explain the various factors which affect prospects for sustainable development in Vietnam, this study considers three areas: (a) The current national environment policy in Vietnam and its limitations in terms of SD; (b) The potential influence of civil initiatives, such as indigenous environmental NGOs, on prospects for SD; (c) The specific potential for the re-use of Hanoi's wastewater in an environmentally sustainable model and the various issues, social, economic and physical, that contribute to or detract from this potential. Chapter Six focuses on the policy formulation stage because, at least in terms of the NPESD, little implementation had occurred at the time of the research.

3.3 Scope of the Study

The research is mainly concerned with potential for ecologically sound development around Hanoi, particularly in the peri-urban section of the district of Thanh Trì. The

research focussed on those aspects of policy that relate to the protection and enhancement of the environment, or the restriction of activities that are known to degrade it. In reality all human activity has some impact on the environment, most of it negative. It is not possible to include all aspects in a limited study, therefore the case of wastewater re-use automatically provides the scope. The scope of this study is those aspects of policy and socio-economic activity that affect the use of the polluted water, that flows out of Hanoi, by the people of Thanh Trì, particularly for agricultural and aquacultural purposes. As civil environmentalism is limited in the case study area, the study includes the examination of other aspects of Vietnamese environmentalism and compares these to the environmentalism that evolved in the former socialist states of Eastern Europe and the former Soviet Union.

3.4 Choice of Site

The Australian Council for Overseas Aid (ACFOA) report (Foley et al., 1991) on Australian NGO perspectives identified the Thanh Trì district, ten kilometres south of Hanoi, as an area in severe socio-environmental crisis. The physical characteristics of low lying topography have contributed to the problems apparently caused by the flow of heavily polluted water, including raw sewage and industrial waste, through the district. Regular flooding, due to heavy rainfall and poor drainage infrastructure compound the problem of water management. No Environmental Impact Assessments have been conducted and no data published on the health impacts to the local and impoverished population (Foley et al., ACFOA, 1991). The report expresses concern about the welfare of the children in the area, describing the children as the smallest, for their age, the authors had seen in Vietnam. Likewise the authors expressed concern for the health of those who work in the aquaculture ponds that use wastewater.

3.5 Data Collection

3.5.1 Principal Methods

The data collection methods used in this study are: (1) Secondary Research which included an extensive literature search, and (2) Field Research. It was recognised that a diverse range of factors can influence the formulation and implementation of policy in Vietnam. To accommodate this breadth, interviews were conducted over a six month period from September 1992 to February 1993 in Hanoi with representatives from; (a) policy makers, both bureaucrats and policy research institute staff, (b) other relevant government officers from ministries and policy implementing agencies, including officials from district, provincial and national levels, (c) interest groups, including groups with interest in both green and brown issues in Vietnam; and (d) a household survey of the case study area and interviews with village level officials and aquaculture company workers.

3.5.2 Key Actor Interview Procedure

The nature of Vietnamese policy development is very much top down and this creates a problem for the researcher as it is difficult to get access to the top echelons of the policy making structure. The key actor interviews were conducted in Hanoi and Thanh Trì. Some additional interviews, other than the household survey, were of a focussed and unstructured type with the focus changing relative to the interviewee. A list of key actors in the study appears in Appendix A.

Evaluation of the social process of policy formulation involves understanding people's perceptions, behaviour and responses, both in terms of the decision making process and the behaviour of the individual within the 'environment' under study. For this case study the interpretive sociological approach has been applied. This approach recognises that the 'human experience is characterised as a process of interpretation' and 'human behaviour depends on how individuals interpret the conditions in which they find themselves'

(Blaikie 1993: 96). The researcher must, therefore 'enter the world' of the researched in order to discover local *meanings* and *interpretations*. For example: is sewage that is flowing through Thanh Trì perceived as pollution or a nutrient resource? Technocrats in Hanoi may perceive it as pollution, farmers in Thanh Trì may see it as a resource. In other words the physical reality varies depending on the *interpretation* of the individual. The ontology of interpretivism is the most appropriate means of gaining the information necessary to address the research questions. This approach enables the researcher to effectively understand the meanings and interpretations of the key social actors. In this way the integrity of the subject matter and the validity of the meanings expressed by people can be preserved.

The key actors were directly involved with the policy formulation and policy implementation process in Vietnam. A standard snowball technique was used to identify these individuals and representatives of various organisations. The definition of the 'snowball' data collection method predicts that each new interview will suggest a further source of information, that being either another interviewee or document or any other source of information. While the method might seem *ad hoc* and 'unscientific' it is probably the most useful and productive method available in non-positivist sociology. It would be tempting to say that the method is particularly appropriate for research on aspects of the bureaucracy in Vietnam which appears to be in a state of organisational flux.

Snowballing is not infallible and does not necessarily elicit the best or most appropriate sources. The data gathering component of this investigation became dependent on a number of local confidants with whom I could confirm the suitability of suggested sources. Confirmation of the appropriateness of recommended interviewees was also possible by checking against biographies of conference participants. In many cases the suggestion as to who to see next was rather implied than stated overtly, although the

implication may have been inadvertent. It is well known that Vietnamese bureaucracies have been traditionally competitive and guard research and information jealously. This phenomenon is a significant barrier to the development and implementation of environment policy because it does not allow the development of interdisciplinary research. For example, one government official will probably not recommend seeing an official from *another* department.

The snowball technique includes the use of bibliographies and conference attendance lists to source 'key people'. This was useful in Vietnam as there have been a number of seminars and conferences on the environment and there is a general lack of government directories. Many of the identified 'key people' resulted in 'dead ends' as a number of conference participants were representing agencies and departments not directly concerned with the subject of the conference.

The key individuals were selected from different levels of the policy process. The selection was based on the appropriateness of the interviewee to provide data specific to the research questions and the case study. For example, policy makers provided insights into the formulation rationale, whereas policy implementors described the reality of applied policy and identified the weaknesses and strengths of policy. Experts from the State agencies that undertake research and provide the technical basis for policy formulation, for instance, the National Centre for Social Sciences, provided background information on the process of policy generation and the limited feedback mechanisms.

Other key people included academics with expertise in the area of development and environmental degradation. Urban planners and the physical scientists who are involved in water quality research and impact assessment were consulted. Economists from organisations such as the Institute for Ecological Economy (see chapter 4), the Institute for

Economic Research in Hanoi, and the National Economics University were also interviewed. Health care workers and village leaders from the Thanh Trì district were interviewed and they described the current situation in the district (see chapter 5). The head of the district health care service provided various data on health issues in the district in general and the perceived impact of the wastewater in particular. The chief engineer of the District, Kỹ sư Tăm was consulted on numerous occasions and was regularly in attendance during various visits to the district. He provided a great deal of the technical explanation concerning the hydrology of the district and the aquaculture process. A number of international aid and development agency workers were consulted if their terms of reference were relevant to the case study.

The interviews, while unstructured, focussed on the issues relevant to the research questions. The focus of each interview varied according to the special interest of the interviewee. This is the nature of unstructured interviews. The importance of meanings in interpretive social research is crucial and given the linguistic limitations of the researcher, interpreters and translators were engaged where necessary.

3.5.3 Review of Policy Documentation

To assess the SD potential, a review of Vietnamese policy documentation was conducted. The review focussed on the principal strategy for Vietnam's sustainable development, the National Policy for Ecologically Sustainable Development to the Year 2000 (NPESD)(SRV 1992b). The document was considered in the light of material that contributed to it, notably the National Conservation Strategy (1985) and the proceedings of a number of conferences concerned with Vietnam's environmental condition. The policy documents were analysed using a qualitative method as the sample was too small and too focussed to make quantitative analysis appropriate.

3.5.4 Household Survey

In order to support the outcomes of interviews with district and city officials a survey of the socio-economic conditions of three villages of Trấn Phú, Thịnh Liệt and Yên Sở in northern Thanh Trì was carried out in January 1993. The survey was designed as part of the data collection methodology of this thesis while being administered as a joint project with the People's Committee of Thanh Trì District. The survey in Thanh Trì was carried out with the assistance and collaboration of Mrs. Mui, Head of Statistics, Department of Planning in Thanh Trì District. The household survey was used in part to contribute to the 'triangulation of data'. It was incorporated into the case study approach, in order to improve reliability[1] , at least as far as the data concerning the district is concerned. Descriptive statistics are used to illustrate particular trends and phenomena in the household survey results. Although non-quantitative methods such as in-depth interviews with individual farmers could have been applied, the questionnaire was preferred by the district administrators, based on the recommendation of the Thanh Trì Department of Planning. All questions were checked and approved by the officials from the People's Committee of Thanh Trì. Qualitative methods were unfamiliar to them and they were reluctant to allow the use of such methods. The compromise was a structured questionnaire with a number of open ended questions applied to a certain selection of houses. The selection was made by the Planning Department and the selection criteria was based on their 'suggestion' that the survey include a range of rich, poor and middle income families. Therefore the selection procedure is unreliable and the quantifiable data collected has been analysed using descriptive statistics only. The quantitative data from the survey contributes to the exploration of the case study.

[1]The question of validity verses reliability is central to the debate in the social sciences on the question of positivism verses more humanistic, hermeneutic and interpretive approaches. Simply, reliability can be improved by methods which approach those of the natural sciences, and are therefore 'repeatable', validity, on the other hand, is thought to be improved in techniques that are more humanistic and interpretive, an interview with one individual which is analysed for the meanings expressed, is completely valid for that case but not necessarily repeatable and therefore not particularly reliable (see McNeill 1985: 12-3).

The questionnaire was based on tentative questions and hypotheses concerning the health impacts of using the wastewater and the economics of aquaculture. The questions were designed to find out the extent to which pond workers suffer skin infections and whether they saw a doctor or treated themselves at home and whether women and children were disproportionately affected. The questions relating to women's health were asked by an all female team. The observation in the ACFOA (1991) report that children in the area appeared small for their age suggests there may be a high incidence of gastric problems. A series of questions were included to throw light on a possible cause. The issue of wastewater re-use and economic advantage was explored using a series of questions designed to determine whether productivity has increased or decreased. The Peoples Committee of Thanh Trì expressed concern that the locals do not really know what negative impacts could occur from using the wastewater (Engineer Kỷ sư Tăm, District Thanh Trì, Interview, 5 December 1991). One objective of the household survey was to explore this concern.

As described above the final sample selection was made at the insistence of the district officials and the respective village leaders. The dangers of collecting distorted data in a survey is ever present. McNeill (1985) warns of the 'artificial situation' of a survey leading to possible false responses. The potential effect on the validity of the answers of having district and village administrators who insisted that they be present for each survey, is difficult to ascertain, although the research assistants from the University were not concerned about the presence of the village and district officials. They felt the greater effect was likely to be caused by the foreigners in the respective male and female survey teams.

The sample population was taken from three of the northern villages in Thanh Trì; Thịnh Liệt, Yên Sở and Trấn Phú The people in these villages are the most exposed to the

wastewater flowing from Hanoi. The sample itself was 'randomly'[2] selected by the village leadership to roughly conform to an even distribution of poor to wealthy households. All the houses selected were available so issues of availability were not relevant. A total of sixty houses were selected representing a total population of approximately 400 residents.

The utilisation rate of the wastewater for aquaculture is highest in these villages. The wastewater in this area is also the most concentrated. According to preliminary investigations the aquaculture and rice productivity in these villages is the highest in the district, a phenomenon which was confirmed and therefore has implications for potential economic development based on the use of a resource such as the wastewater. The smallness of the children in the area, as observed by the ACFOA team in 1991, did not seem consistent with the claims of relative wealth for the area. Therefore this apparent contradiction was explored with regard to the general socio-environmental conditions.

The survey was conducted by three teams, one of which comprised only women, Lanh and Gilsenan, who conducted the 'Women Only' component of the survey. The questions from the household survey that are used in the analysis appear in Appendix B.

3.5.5 The Aims of the Household Survey

The overall aim of the survey was to more accurately describe the issues of the area with regard to the use of the wastewater from Hanoi as a resource for aquaculture and market gardening. The interviews with the various bureaucrats and officials had painted a particular picture and raised hypotheses about certain contentious issues. Local officials interviewed had explanations for the various issues. Therefore the survey aimed in part to

[2]The actual method they used to select each house was not made clear to either myself or my research assistants, nevertheless I was assured by the district statistician that the process was 'scientific'. It seems more likely the method was a selection of households based on wealth.

test these explanations. The survey was not designed to test any grand theory, instead it is a component of the case study that contributes to the construction of grounded theory.

The specific aims of the survey were to elaborate on the following issues:

- The demographics of the northern villages; considering issues such as the number of family members involved in aquaculture, and the number of family members commuting to Hanoi or at least to 'off farm' work places,

- The economics of the northern region including some indication of the economic benefit to the family from the utilisation of the wastewater,

- A survey of some health issues in the northern region of the district including those issues specific to women and children, to provide some indication of the health impacts on the family from the utilisation of the wastewater.

3.6 Data Analysis

The notion of 'grounded theory' is to develop theory from the data, rather than using data to test a hypotheses, or grand theory. The application of some aspects of the method allowed this research to approach a situation, like contemporary Vietnam, with less preconceptions than may otherwise be the case.[3] Grounded theory takes an explicitly phenomenological stance. Glaser and Strauss (1968) advised against taking theory into the field and consequently gathering data which credits or disqualifies a 'theory'. Instead,

[3]Both Critical Theory and Grounded Theory fall within the Abductive research strategies as both are interpretive. Abductive Research Strategies includes Realism, Structuration Theory and Feminism. All these are based in the Hermeneutic tradition. See Blaikie (1993) for a comprehensive review of sociological research methodologies and the philosophical underpinning.

data relevant to a particular social 'problem' is collected, the data is 'inspected' to see if any theory or hypothesis can be developed directly from it (Tesch 1990: 23).

The method used for analysis in this thesis is an adaptation of Glaser and Strauss' (1968) system of 'constant comparison'. In their approach the data are ordered into preliminary categories, according to their conceptual context, then compared within a category to establish consistency, and compared across categories to establish boundaries. The concepts in each category are then refined into a theoretical notion. The researcher can then consider whether the various notions are connected, thus forming a hypothesis 'grounded' in the data. The analysis compares the data to the features of sound or weak environmental management and this is developed into a pattern representing opportunities for and barriers to sustainable development. The 'grounded theory' is the identification of these potentialities.

3.7 Methodological Limitations

Doing policy research in Vietnam has special limitations given the general lack of transparency in government institutions. It is not possible, for example, to easily identify the process by which policy ideas are formulated and who specifically is involved. Fahey (1994) has acknowledged the complexity and contradiction in Vietnam which necessitates a cautionary approach to any research methodology and particularly any comprehensive conclusions.

In a number of cases the initial selection of key people was inaccurate because despite the title of the individual, and the name of the institutions, they were not 'key actors' relative to this study. In a number of cases the key actor identified was chosen because of an expected expertise. The Director of the Institute of Philosophy, Assoc. Prof. Dr. Nguyễn Trong Chuan for example, was chosen to cast light on aspects of environmental philosophy in

Vietnamese thought, but proved to be particularly familiar with theoretical aspects of SD and the potential for it in Vietnam. Therefore, the interview focus changed during the interview to capitalise on his expertise.

The snowball technique effectively eliminates those institutions and individuals that are at first considered for participation but are not included on the advice of mentors and confidants. The use of the snowball technique can be very limited if only the suggestions and advice of the key actors is used as the basis of the appropriateness of others. For example, given the rivalry between ministries and institutes, it became clear that many would not recommend others who may be working on a similar area but for another ministry. It was not clear whether this was deliberate or a genuine ignorance of the work of the other, an equally likely explanation.

3.8 Conclusion

This chapter has described the methodological issues of this study. This study is predominantly a qualitative interpretive approach. The case study style is used to provide a framework and the scope is limited to those issues and activities that contribute to environmentalism in Vietnam and have some bearing on the continued re-use of wastewater in the district of Thanh Trì. The material collected as part of this study is analysed qualitatively by using a process of constant comparison with a simple scale of ecological sustainability. The purpose of this analysis is to identify what barriers exist to SD in Vietnam.

The following chapter examines some aspects of the environmentalism that evolved in the former Soviet Union and socialist Eastern Europe and compares these to the contemporary experience of environmentalism as it is expressed in Thailand and Vietnam.

Chapter Four

Environmentalism and Sustainable Development

4.1 Introduction

In this chapter some aspects of environmentalism as a political dimension of sustainable development in Vietnam are examined. Vietnam is both a communist state and a Southeast Asian nation with a predominantly agricultural economy, pursuing reforms and development goals of rapid industrialisation. Therefore to inform the argument that an embryonic and growing environmental movement is affecting the potential for more sustainable development in Vietnam, this chapter considers various cases of environmentalism in the former communist states of Eastern Europe and the Soviet Union and contemporary Thailand.

In this chapter examples from the literature on dissent, protest and opposition in Eastern European and the Soviet Union are given. Also considered is the degree to which local autonomy and regionalism were generated by grassroots initiatives. Further, the characteristics of the membership of the various environmentally orientated movements is discussed and how these have contributed to more sustainable outcomes.

The case of environmentalism in Thailand is used because Thailand is considered to be a good example of newly industrialising development by the Vietnamese Government. Therefore while the experience of environmentalism in Thailand is different from that of the former communist states of Eastern Europe, it does inform the exploration of the phenomenon in Vietnam because of the economic and developmental similarities between Vietnam and Thailand.

The nature of environmentalism in Vietnam is explored below, focussing on three examples of environmental activity: the Institute for Ecological Economy (Eco-Eco and IEE); the Hanoi Association for Conservation; Nature and Environment (HACNE) and the Centre for Resource and Environment Studies (CRES). Finally, some parallels between the nature of environmentalism in the other countries and the current developments in Vietnam are drawn.

4.2 Environmentalism in Former Socialist Countries

In Vietnam the communist party continues to be the political vanguard, therefore consideration of the environmentally motivated political developments in the former communist States in Europe and the Soviet Union are relevant. The air and water quality in the former socialist countries of Eastern Europe and the former USSR became the worst in the industrialised world. Environmental standards where they existed were largely ignored or were so low as to be ineffective. During the 1980's, a range of political responses to the poor condition of the environment developed. It is argued that these political responses represent activity within the civil society of the various countries. These civil initiatives became active before, and in many cases no doubt contributed to the various 'soft' revolutions in the late 1980s and early 1990s.

Although there were links between an active environment movement in the former socialist countries of Eastern Europe and the Soviet Union and the subsequent political reform, this thesis does not argue that a similar development will occur in Vietnam. The existence and activity of the Eastern European and former Soviet environmental groups have had a significant impact on the transitional development agendas within their respective countries and this is relevant to Vietnam's current state of economic transition. In addition to this broad concept are the characteristics of social movements developed by Frank and Fuentes (1987: 143-165) which include the notion that social movements are varied and changeable

but have in common individual mobilisation through a sense of morality and injustice, common identity and outrage. Further, that social movements also grow in importance during times of economic and political crisis (ibid). Importantly in terms of these examples, social movements in Eastern Europe and the former Soviet Union include representatives from all classes and social strata. Frank and Fuentes (1987: 52) also observed that the majority of social movements seek more autonomy rather than state power.

The variation in responses between the former socialist regimes to the environmental movement is important and does not imply that there is a generalised reaction from governments to increasing environmentalism. The phenomenon of state tolerance of environmental protest in the respective former communist party dominated states is explored below and the degree to which such protest became the focus of an oppositional force and led to increased local and regional autonomy. These examples demonstrate the way local grassroots initiatives contributed to a broader dissent. This issue is relevant because there is a similar historical tradition of local autonomy in Vietnam.

The issues of environmentalism explored below have two distinct themes of relevance for the prospects for SD in Vietnam. Recalling the theoretical delineation outlined in chapter one, between reformist and revolutionary positions, this chapter explores how these themes are manifest in examples of environmentalism which are either 'captured' by state authority, and may reform policy, or compared with those civil initiatives within an environmental context that have challenged centralised state control and propose more radical solutions.

There are a number of themes that are apparent in the Eastern European experience that are relevant to Vietnam. These include the phenomenon of on-going state tolerance of apparent

dissent coming from the environmental movement (Yanitsky 1990). The increasing use of direct political action in the form of protest to voice opposition to centrally planned developments was a contributing factor in increasing autonomy, both regionally and locally. These developments have a number of characteristics in common with the embryonic environmental movement in Vietnam, particularly the grassroots basis of much of the oppositional force and the eclectic nature of the movement's membership.

> It is by no means accidental that ecological initiatives have provided the impetus for the formation of mass organisations such as popular fronts. The eco-movements already have their own history, traditions, leaders, and extensive contacts, and most importantly, a constructive orientation and close ties with independent science. Finally, it is of fundamental importance that these movements are for the most part orientated to changing the system of values. In this sense they are the most radical of all civil initiatives (Yanitisky 1990: 39, emphasis added).

In Vietnam, the environment movement that has achieved a degree of expression has many of these features which are described in detail in section 4.5. While the Vietnamese environmental movement has evidence of strong leadership, extensive and influential contacts and close ties with arguably independent science, it is the degree of orientation toward 'changing the system' that is most controversial.

4.2.1 State Tolerance of Dissent

One of the central features of the environment movement in the former socialist countries of Eastern Europe and the Soviet Union is the fact that they existed at all, given the respective regimes' tendency not to tolerate any dissenting views. This feature of the environment movement is central to the proposal of this thesis that support for environmental issues in Vietnam will inevitably challenge the legitimacy and credibility of government policy (see chapter 5). The role of scientists and technocrats in Vietnam will be crucial in this process. In Hungary, for example, the role of experts changed as the freedom to express dissenting opinion increased (Persanyi 1989: 4). The opinion of scientists had always been respected

by both the state and the population in general, as it was considered to be objective rather than political. This perception was based on the common view that because science claims to be rational and objective then it must be value free and apolitical. This perception allowed scientists to take on an increasing role as activists in environmental conflicts and protests. In Poland, for example, the Vice President of the Polish Ecology Club believed that their organisation was 'tolerated' during the former regime because concern for the environment could be seen as an expression of nationalism, and therefore less of a threat to the political legitimacy of the regime (Feshbach and Friendly 1992: 128).

The former Hungarian state controlled the activity of the environment movement through the National Patriotic Front (NPF) which established working groups, organised conferences and coordinated any environmental program initiated by other mass organisations. The task of environmental protection was, therefore, distributed amongst the various social organisations as appropriate. For example, the youth organisations would lead actions within schools, the trade unions within factories and angling clubs along the river banks. By the mid 1980s, various organisations that had accepted the NPF's coordinating role were themselves becoming more independent. The State influence on the mainstream scientific organisations declined as political reforms increased and these organisations tended to side increasingly with the oppositional environment groups. In some cases, they had become arbiters as they continued to have a degree of credibility with both sides. This is relevant to Vietnam because state-sanctioned mass organisations have a similar coordinating role. While a degree of environmentalism was expressed within the state sanctioned organisations it was the development of openly oppositional protest that affected the political culture in Eastern Europe and the former Soviet Union.

4.2.2 Protest and Opposition

Environmentalism in Eastern Europe and the former Soviet Union became a catalyst for political opposition that culminated in the undermining of the power of the respective communist regimes. Views differ on the singular impact of the environment movement per se because many oppositional parties in different countries changed their platforms from predominantly environmental to more general opposition as the political space allowed. Although the behaviour of oppositional parties in the former communist regimes is not relevant to contemporary Vietnam, the impact of environmentalism as a political expression, within civil society, is potentially very relevant.

As in the West, the environment movement in Hungary was over-represented by educated intellectuals and the young, particularly students.

> The attitude of oppositionists or early internal dissidents first of all has shown that the weak points of environmental policies provide a new breeding ground for the opposition of the entire political practice (Persanyi 1989: 2).

The Hungarian Socialist Workers Party (HSWP) politically 'contained' any environmental activity within the mainstream political institutions during the 1970s, and up until the mid 1980s. As the reform process accelerated, Persanyi wrote '[C]itizens have become unsatisfied with the opportunities offered by the traditional social organisations directed from above' (1989: 4). In 1986, the Party rejected proposals to form a legally accepted national environment association but environmentalists found other ways to organise and 'influence and mobilise masses without party or state approval' (1989: 5). In 1988, the Hungarian Society for Environmental Protection (HSEP) was established using the traditional state sanctioned process, but already the reform process was under way and a number of alternative environmental associations had formed. Very few from the civil environment movement joined the state-sanctioned society. The HSEP continued to exist

although outside the new civil environment movement and represented traditional interests with a membership based on the local environment committees established under the NPF.

In contrast to this in the former Yugoslavia, the Slovene environment movement transformed the concept of environment protection from a technical one, dealt with within the technocracy, into a political one which the former government could not absorb. The Greens were a problem for the Slovene government of the late eighties because the groups challenged the broad thrust of government policy and the 'very foundation of the regulating and directional role of the (socialist) government' (Kos 1989: 11). In the Slovenian experience, the political nature of the 'new' groups threatened the position of the 'old' conservation movement, itself a part of the socialist political structure. The 'new' groups were critical of the narrow focus of the 'old' and the consequent waste of resources and 'mobilization potential'.

In Slovenia, two types of environmental NGOs developed during the 1980s, societies for environmental protection, tending toward reform of current policy, and the more radical 'new' green movements. By the late 1980s there were about 25 of the former, and they generally focussed on a specific local area. The philosophy of these groups was typical of reformist conservation movements in other countries, in that they did not question the state authority and the development direction, instead, they warned of the consequences of an isolated industrial or development process in a particular location. Therefore, they did not challenge strategic policy.

From 1987 a similar phenomenon developed in the former Soviet Union as an increasing number of protests occurred across many of the republics. Some were expressing opposition to new industrial projects or dams, however, most appeared to be expressions of protest about the continuing pollution of the air and water. Although protesters won

some of the battles, a general cause of environmentalism was not represented. The protests tended towards the 'one-off single-issue' type and any 'movement' that was generated lasted only for the life of the issue. At this time, women residents and workers of Volgograd began to protest over the disturbingly high number of deformed births and severely retarded children born in the area. The head of one oil refinery's Women's Council formed an Ecology Club which they registered on 4 December, 1987. Within a few months the club had several hundred members. The first 'action' of the club was a published appeal to the then Party leader, Mikhail Gorbachev, to protect the residents and workers from the toxic pollution in the area. In February 1988, more than three thousand people attended an Ecology Club rally.

As membership increased, the political saliency of the issues in the Volgograd area became apparent. The proposed construction of a pesticide factory became the focus of an otherwise unfocused and disparate movement. To protest against the construction of the pesticide factory, the Ecology Club collected 30,000 signatures from 180,000 residents in the district and made a presentation to officers of the Communist Party Central Committee. Those members of the club that made the presentation reported that it was the petition that attracted the attention of the Party officials. Feshbach suggests that it was this progression from protest to political power that threatened the Party's control (Feshbach and Friendly 1992: 14)[1].

One of the basic requirements of a lobby group is information. For example, the central problem for Polish environmental groups was the lack of hard data because the 'old regime suppressed, fabricated, or just failed to collect data about both human exposure to

[1]Feshbach (1993: 65) suggests that in the non-Russian republics the line between protests against Moscow for ecological reasons and a general nationalism was, at the time, becoming less distinct.

pollutants and health effects' (Feshbach and Friendly 1992: 15). On the other hand, the *glasnost*[2] phenomenon allowed consumers in the former Soviet Union to make more informed choices about food products that had been assumed to be safe in the past. Vegetables and fruit were rejected by consumers for fear of exposure to pesticides and nitrates (Richman 1990: 6). The new flow of information exposed the former regime's disregard for the potential human cost of environmental pollution,. Consumers were outraged when, for example, the Ministry of Public Health had increased the maximum permissible levels of radiation in meat to allow the sale of meat from the Chernobyl area after the accident (Richman 1990: 6).

4.2.3 Regionalism, Autonomy and Grassroots Initiatives

Given Vietnam's tradition of local autonomy it is relevant to consider the regionalism and autonomy in the environmental movements of Hungary and the Soviet Union. A number of locally based and organised 'village protectional and improver societies' were formed voluntarily in Hungary during the early 1980s and, although these groups were coordinated by the NPF, the initiatives were local and driven' from the 'bottom-up'. Persanyi (1989) suggests that, in some cases, these local groups were established contrary to the wishes of the local authorities. These quite autonomous groups followed the tradition of the NPF and coordinated a network for information exchange and coordination of activity. By 1986, more than thirty such groups formed the Association of City and Village Protector and Improver Societies; by 1989 membership had reached 150 separate groups.

The new political organisations which emerged in Hungary during 1988 all had some degree of environmental platform. Most of them were, to some extent, involved in the environmentally-based conflict over the various Danube dams proposals during the 1980s.

[2]The policy of economic reform leading to an increasingly market based system in the former Soviet Union.

This developed into what was known as the 'Danube-movement' which has been likened to 'rainbow' type Red/Green political alliances in the West. Despite this political/environmental contact, few of the new parties actually had an ideological commitment to an ecological position. The struggle against the dams and the subsequent proposal for the Nagymaros water barrage, became a socio-political conflict against the State, based on ecological grounds (Persanyi 1989: 3). The issues became a common focus for all oppositional forces and united many groups that did not necessarily share an ecological position. Indeed, the majority of the new parties had a platform of continuing industrial development and a market-based economy, with little consideration for the potential socio-environmental impacts of such a development scenario. During the transitional period in Hungary, the various political parties have only used an environmental agenda on political rather than ecological grounds.

In the Hungarian case, the significant theme was that environmental issues became the rallying points for a diverse range of new political forces. The opposition to a dam, for example, may have been framed as a crusade to save a part of the natural environment, a goal with increasing and wide support, or a way of protesting against entrenched power. The protest was against the proposed dam, while the intent for many involved was to protest against the regime that made the proposal. In the Soviet Union, ecological protest has been, invariably, more complicated and more important politically than may first appear.

A further significant feature of former socialist countries' environmental movements was that the new ecology groups opposed the administrative-command system and were not a captured part of the state, unlike the 'traditional' nature conservation movements. This was based on the realisation of the members of the 'new' movement that 'the principal enemy is not pesticides, not technology, but the system that uses them' (Yanitsky 1990: 42). The

initial 'targets' of the various ecology groups were specific projects such as the sites of proposed nuclear power stations or the construction of a canal for diverting a river. Progressively, the focus moved towards the 'process' of how such decisions are made and why alternatives were not considered, essentially towards a critique of the former system itself. In the former Soviet Union, 'many popular fronts drew on this concern for the environment, interpreting environmental destruction in non-Russian republics as proof of Soviet colonialism while other unofficial groups claimed 'the only way to avoid another environmental disaster on the scale of Chernobyl was through more *peristroika* and *glasnost'* (Painter 1990: 56). In contemporary Vietnam the expression of environmentalism is both within and outside state control and to some extent the movement is testing the degree to which it can influence the system.

4.2.4 Motivation of Membership in the Environment Movement

A vast range of factors can motivate individuals to become active in the environment movement. This thesis suggests that there are similarities between what is happening in contemporary Vietnam and certain features of Eastern European and former Soviet environment movements.

In Poland, for example, the Ecology Club attracted a mainstream membership of 'doctors, lawyers, and engineers who realised they could not do their jobs in good conscience without challenging the regime' (Fischhoff 1991: 17). The accident at Chernobyl acted 'as a catalyst for environmental activism' throughout the former Soviet Union and Eastern Europe (Fischhoff 1991: 17). In post-socialist Poland, with as much as eighty per cent support for Solidarity, the jobs-versus-health debate occurred between sub groups based on region or workplace. For many there was the dilemma of the negative impact on their health of the factory upon which they were economically dependant. In the former Soviet Union, the evidence of chronic unmitigated pollution is now well documented, but during

the mid eighties information was not widely circulated. The 27th CPSU congress confirmed glasnost as official policy. Feshbach suggests that the environmental disaster of Chernobyl a month later did much to 'test the regime's sincerity about glasnost' (Feshbach and Friendly 1992: 47). The increasing ground swell of uncensored discourse that followed led to the mobilisation of environmental activism.

In the case of the former Yugoslavia, there was a decline from 1987 in the level of activities after 'the initial, euphoric mobilization' (Kos 1989: 6). It became clear that during the first ten years of Slovenian environmentalism a certain number of intellectuals were playing a predominant role. The level of mobilisation had varied over time, but the environmental expertise and activism of a few individuals continued. According to Kos (1989) these people tend to be social scientists and philosophers, with technical and natural scientists under-represented, because they 'seem to be almost completely fascinated by the rationalistic growth-development philosophy' (Kos 1989: 6). This characteristic of Slovene environmentalism is typical everywhere, except perhaps in Vietnam, where Eco-Eco's and HACNE's, for example, respective memberships are predominantly natural scientists.

In regard to the Habermasian notion of 'collective identification', it was clear from the Soviet experience that neither class, age, nor occupation played a significant role in the motivation of individuals to join. Locality, on the other hand, contributed to the single issue, Not-In-My-Back-Yard groups. In the case of worker protest about occupational conditions in the former Soviet Union, 'collective identification' was not the factor which united the group. Instead, the integrating factor appears to have been the values and goals of the participants and the notion of the 'preservation of the "world of life" of which people are a part' (Yanitsky 1990: 41).

In the Soviet Union there was a growing notion of 'do-it-yourself', which defied the modern tradition of state control, but appealed to the growing sense of independence and local autonomy. Yanitsky (1990) believes that the tumultuous impact of a society in transition, as the former Soviet Union was in 1990, left people ideologically 'confused'. The appeal of the universal human values of environmentalism and the creditability of science was very attractive as a 'point of reference'. 'A general "ecologization" is today becoming such an ideology and in the eyes of many people is especially attractive because it is not a rigid or a politicized ideology' (1990: 46). Many of the emerging political parties included varying degrees of environmental rhetoric. Kos suggests that all political parties, regardless of ideological roots, now incorporate some aspect of green discourse in their platforms. For the former communist ideologues of Eastern Europe '[T]he [new] ecological "ideology" offers an epistemological way-out for those who quite recently predicted the end of capitalism' (Kos 1989: 4). Therefore support for a third alternative, such as ecologism, did not concede defeat to capitalism.

For the former socialist regimes the development of ecologically-based new social movements were epistemologically problematic because they were not based on the relationship between labour and production, but on a more holistic concept of life within a broader philosophical space. This philosophical space included local environmental quality, the quality of food stuffs, the quality of air and water, and the political 'space' within which to question why these things were being degraded.

Soviet environment movements were a 'conglomerate of civil initiatives, voluntary associations and movements in the true sense of the word' (Yanitsky 1991: 526). Yanitsky divided the movements into three distinct strands: ecological; protection of historical and cultural monuments and buildings; and the specifically 'environmental'. The most powerful of these is the more scientifically based 'ecological' movement, which can trace a history

back thirty years to the student-based 'nature protection teams' which were based at Universities and colleges, and focused on local ecological projects. Although these groups were originally purely conservationist, although some used protest-based action, they have, in more recent years, developed into true 'new social movements' as they now hold post-materialist values. They explicitly oppose the bureaucracy 'and are creative in their functions and operate through methods of direct democracy' (Yanitsky 1991: 525).

Another important feature of the environment movement in former socialist countries is the 'anti-bureaucratic' nature of the ecological organisations, as they are based on largely autonomous cells, horizontal rather than vertical connections, and networks rather than hierarchies. The environmental organisational 'structure' was quite unlike the administrative command system it opposed. Yanitsky observes that, early in the transitionary period in the former Soviet Union, the new ecology groups acted as 'support groups for republic and Union wide movements (popular fronts)' (Yanitsky 1990: 42). Further, 'they [were] becoming the most politicised small groups in the social environment, and are again assuming a "mobilizing" character' (ibid). The political developments in Hungary, as within other former socialist countries, had been moving towards increasing regional autonomy and away from central authoritarian control. Both these developments are consistent with the more radical contemporary positions on SD models such as bioregionalism and anarchic human ecological views.

The developmental and environmental context of the former Soviet states and the former socialist states of Eastern Europe was one of declining centralised control and increasingly salient environmental issues. The very poor pollution record of many of those states is well documented and is of such proportion that it remains unclear how long it will take to be resolved. In cases such as Chernobyl a time frame is impossible to predict. The increasing desperation of the residents and workers to protect their living and working conditions led

to political action of various types. Vietnam has similar, albeit smaller scale, environmental problems caused by industrial pollution and natural resource degradation as in the former socialist examples above. It is clear from the examples, and many others around the world, that when people feel that the risks of the status quo are too great and out-weigh the risk of action against it, they will mobilise.

The increasing political saliency of environmental issues in the various former socialist countries is pertinent, because as Feshbach and Friendly (1992) noted in some cases these were also expressions of frustration with distant centralised control. Importantly the degradation of local environmental conditions focussed attention on the political issue of control of that environment.

Throughout Southeast Asia authoritarian regimes are pursuing uncompromising development policies of rapid industrialisation and resource exploitation. These developments are occurring within negligible environment protection. The case of Thailand is a further example of the impact of such development on environmentalism with elements of local resource and environmental control.

4.3 Regional Experience in Asia

All countries in Asia have experienced environmental degradation. The type of degradation and the response to it vary. In predominantly non-industrial Indonesia, for example, the pressing issues of forest resource depletion have been uppermost. In highly industrialised Taiwan and Hong Kong, it is the effects of industrial effluent that have spurred action. Low and Balamurugan (1991) suggest that, despite legislative requirements for on-site treatment of waste, little was done in either Malaysia or Thailand, as government agencies ignored violations in light of the economic contribution being made. It was only in the early eighties that these governments enforced regulations on effluent quality.

In other cases such as Hong Kong and more recently the rest of China environmental regulation does exist but is not enforced, 'a huge gap lies between the law, compliance and enforcement' (FEER 1997a). In Hong Kong a lack of progress on environmental issues has lead to the establishment and the importation of a range of environmental groups including the 'multinationals' such as Greenpeace and Friends of the Earth. These international groups are in a better position than local groups to raise the global awareness of particular issues, such as the Greenpeace campaign against the increasing practice of certain companies based in the west to export toxic waste for reprocessing in China (Personal Communication M. Ruchel, Manager, Toxics Campaign, Greenpeace Australia). Typically the process is to incinerate the waste at relatively low temperature brick kilns which not only does little to reduce the toxicity of the original waste but often exacerbates the toxicity by chemically modifying some compounds. Further the process of incineration distributes the highly hazardous waste as fly ash across the surrounding environment.

Friends of the Earth Hong Kong have campaigned to raise the awareness of residents and the business orientated government on the impact of air pollution. While the Hong Kong Chamber of Commerce acknowledges that increasing pollution might increase costs, Friends of the Earth have calculated the cost to the community of increasing respiratory illness, absenteeism, and reduction in tourism at HK$3.7 billion a year (FEER 1997a).

In terms of the impacts of industrial pollution, Vietnamese commentators often compare their country's stage of development to that of Thailand and Malaysia some years ago. The question arises as to whether this will translate into a similarly delayed government policy response to environmental issues and a consequent environmental protest action.

4.3.1 Environmentalism in Thailand

In Thailand, high profile examples of vanguard environmental action have come from within the royal family and the church, particularly the campaign for the preservation of rainforest in the north of the country, an area coming under increasing population pressure and subject to government agricultural policy that has encouraged unsustainable rural development. Although the environmental degradation in this case was obvious to the people living in the area, and a concerted attempt was made by the locals to change the development direction of the central government, it was not until the intervention by members of the Thai elite that decisive action was taken. (FEER 1989: 40)

According to Hirsch (1994: 6), Thailand is progressively implementing more market-oriented environmental regulatory measures, such as 'polluter pays', and moving away from the ineffective 'command and control' methods. The continuing weakness is the lack of monitoring, an issue which is critical to the environmental performance of market and industry-based regulation. Despite these institutional changes, there have been civil sector developments that, according to Hirsch (1994), have utilised the 'legitimising discourse' of environmental concern to empower otherwise marginalised oppositional forces. Such an outcome was a typical feature of the early development of the environment movement in Eastern Europe and the former Soviet Union. In terms of regional environment policy models, Hirsch (1994) concludes that, except for the 1992 National Environmental Quality Protection and Enhancement Act, Thai policy and regulation has generally been ineffective in mitigating impacts of industrialisation and urban growth.

There are various theories as to what constitute the principal factors behind the growing environmentalism in Thailand. Hirsch (1994) concludes there are various responses to the physical impact of development, such as pollution, and the 'material' issues of access and control of resources in a Marxian sense. While the former is characterised in a response to

the bio-physical risk of pollution or resource depletion, the second 'material' approach is to consider the 'livelihood and resource base of the different societal groups as a background to their involvement in environmentalism' (Hirsch 1994: 10). A critically important point is that it is the rural poor who are often the most disaffected by mainstream industrial development that favours capital accumulation within urban areas. While it may be a commonly held view that the middle class are predominant in environmentalism, it is the rural poor who are most at risk from environmental degradation and resource depletion of 'development'.

In Thailand some authors (Boonyanate 1992 for example) have identified an ecologically benign Buddhist development concept based on the pursuit of the 'Right Way' or Samma-Dhithi. Boonyanate's concept is diametrically opposed to current Thai development policy, as it rejects the concept of growth and replaces it with a "small is beautiful" principle. The Buddhist development concept would replace the export-oriented development scenario with agricultural self reliance. The principal 'barrier' to the development of a Buddhist mode of development is that spiritual development takes time to achieve, particularly in the face of a rapidly increasing temptations of a consumer oriented society (Boonyanate 1992: 76). To what extent the resurgence of religious activity in Vietnam may influence the development of community attitudes relating to the environment is yet to be recorded.

Thai environmental politics is complicated and defies simplistic class based analysis. The rural poor have increasingly formed alliances with middle class social 'actors' such as NGO's. Such cross-class alliances were quite common in the West in the 1970s, for instance, the 'green bans' by trade unions against environmentally unfriendly developments. Such a phenomenon was also the hallmark of the early 1980s environment movement in Eastern Europe where alliances between apparent disparate groups, such as within the anti-Danube dam alliance, emerged.

Of particular relevance to the question of what foreign environmental influence is salient in Vietnam is what Hirsch (1994) identifies as the importation of Western environmental thought into Thailand due a long history of western-trained Thai elites. Hirsch suggests that this is an important factor in the way environmentalism has developed. This is an important factor in Vietnamese environmentalism as academic contact with the West increases (see chapter 5). Such technocratic environmentalism in Thailand 'has become integrated to an increasing degree into the thinking of key government departments and think tanks' (Hirsch 1994: 12). A second avenue for importation of Western environmentalism is the activities of some NGO's who act like western environmental groups and are integrated into the 'international environmental movement'.

Another important theme which has emerged in Thai environmentalism, and is becoming increasingly relevant in Vietnam, is the issue of central development control and progressive trends toward decentralisation and the consequences this may have for sustainable outcomes. Such trends reinforce the potential for regional anarchic SD visions as state regulation and centralised control fail to be implemented, and local participation and empowerment become more desirable. On the one hand, centralisation in Thailand has been the historical principal force reinforced by the system of governance and the national policy goals of achieving greater international economic integration and rational planning (Hirsch 1994). This is contrary to a decentralised anarchic model of development. On the other hand, forces tending towards decentralisation are an 'increasingly significant item on the wider political agenda of Thailand' which may support such a more environmentally benign model and therefore represent an opportunity for improved sustainability in Thailand (Hirsch 1994: 9).

There are a number of aspects of the Thai experience which inform this study. For example, the importation of environmental thought from the West either through the activities of organisations such as the UNEP or the increasing number of Vietnamese students trained in Western Universities. This thesis does not imply that the development of environmentalism in Thailand will necessarily influence such developments in Vietnam, although it would be reasonable to assume that, as international reporting into Vietnam becomes less restricted, environmental stories from the region will influence those who might be predisposed to be affected by them. The experience of cross-class alliances forming against 'common' environmental threats is typical of environmental movements everywhere and has been the case in both the former socialist states of Europe and in Thailand. The conclusions of this section however cannot necessarily be generalised to the situation in Vietnam although there are indications.

4.4 Environmentalism in Vietnam: The Hông Gai Case

The development of environmentalism in the former socialist states of Eastern Europe and in Thailand highlight a universal trend toward a NIMBY community response if the risk is considered great enough. The following is a case study of some of the socio-environmental impacts of coal mining in Quảng Ninh province of northern Vietnam. It shows the willingness of ordinary Vietnamese people to protest directly and publicly against environmental threats. It demonstrates the dilemmas that reveal themselves at the core of inconsistent development policies and it exposes the low quality of an EIA process that did not anticipate the eventual outcome. The case also highlights the lack of inter-agency coordination in Vietnam, which is identified in chapter Six as a significant barrier to sustainable development.

Quảng Ninh is the northern-most coastal province in Vietnam with a population of 865,000 (1992) and a population density of 140 persons per km^2. The area of coast around Ha

Long Bay in Quảng Ninh province is one of the most spectacular in the world and would compare to any listed as world heritage. The shallow bay is dominated by hundreds of limestone karst precipitous islands. The great natural beauty of the area has been the focus of an expanding tourism industry. The province is, however, extremely poor with widespread unemployment and a predominance of seasonal workers.

The case of coal mining and processing in Hông Gai is interesting from two perspectives. Firstly, the case is typical of the conflicts that are created between competing economic interests who are conducting different activities within the same space. Secondly, and more importantly for this thesis, was the fact that citizen protest against the siting of the new coal processing facility led to a petition with 14,000 signatures, going as high as the Council of Ministers, and a consequent visit by the Prime Minister to the area who then recommended that the facility be relocated away from the centre of town[3]. The petition was signed by residents who were concerned that the site of the new facility would further degrade their already poor living conditions.

The coal mining and processing has polluted the bay, the principal resource for the tourist and fishing industries, and the open cut mine has radically modified the potential land use in the area, reducing the potential for forestry and other more sustainable uses.

The coal processing project, which led to the petition being sent to the Council of Ministers, was initiated by a former Vice-Minister for Coal and Mining (now the Ministry of Energy, or MOE) after a visit to Australia in 1990. A project was designed[4] around the

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[3]According to Thaveeporn Vasavakul most petitions are sent as high as possible because it is assumed that the lower party echelons are corrupt and therefore have little credibility (Vasavakul 1996: 53).

[4]The Research Institute of Coal Mining, an advisory body to the MOE, was not, according to the Institute for Scientific Management (ISM) report, informed of the project or its proposed location.

concept of replacing the current facility in the centre of Ha Long City with a new factory. The concept was picked up by the Director General of the Hông Gai Coal Company, one of three companies under the MOE in the area. The primary aim was to boost coal export opportunities by increasing the quality of the coal.[5]

The ISM reports that the 50% of the local population who are coal miners were concerned that their non-working environment would become as degraded as their working conditions in the mines. Recent changes in the intensity of the exploitation of the resource have led to increases in skin and lung disease in the general population, as well as 'silicosis affecting 3/4 of the miners' (Greenfield 1994: 212). Pressure to reform practices had come from the miners themselves' because they had "struggled against bureaucratic strata, tension over wages from the mid-1980s and increasing lay-offs up until 1991, these developments coupled with increasing military ownership of the coal enterprises undermined 'worker solidarity' in the region (Greenfield 1994: 212). A petition against the siting of the project collected 14,000 signatures which were sent to the Quảng Ninh People's Committee and the Council of Ministers in Hanoi. According to the ISM report, this action put great pressure on the central government which led to a number of high level investigations and, ultimately, to the Prime Minister, Võ Vân Kiet, visiting the site.

It is not clear from where, or from whom came the idea of collecting a petition came. It is not a traditional political action in Vietnam which suggests that a foreign influence was involved. Greenfield's analysis of the issue concludes that the government directives to 'reduce the air pollution in the coal mining towns of Hông Gai and Cam Phu were

[5]The project was worth USD 11 million plus an additional USD 1 Million for the waste treatment system. The project was to be funded with an Australian bank loan at 8.5% over five years. The scope of the project required Ministry of Science, Technology and Environment (MOSTE) approval and therefore an EIA. The EIA was carried out by Australian consultants, as required for any project receiving AIDAB (now AusAID) funding and their report found that it would not affect the surrounding environment nor the lives of the local people!

concerned with cleaning up the area for the tourism industry, not the health of the miners and their families. This coincides with the shift of state wealth out of coal production and into the tourism industry' (Greenfield 1994: 212).

The chief engineer of the Hông Gai Coal Company acknowledged that by not incorporating the waste treatment plant in the new facility there will be a direct environmental 'cost' from greater pollution in Ha Long Bay (Bịch Tấn Sinh. 1994). This 'cost' to the fishing and tourism industry was not taken into account when considering the economic feasibility of the waste treatment system, as it should have been if a comprehensive economic feasibility study was undertaken. Likewise, the financial return on the coal recovered, as part of the new treatment process, would not offset the investment (Bịch Tấn Sinh. 1994). The Chief engineer argued that the pollution 'problem' should be solved on a cross-sectoral base which is both an acknowledgment of the current low level of horizontal integration between stakeholders and also support for a more environmentally sound system of local control. The engineer argued that as the tourist industry is the primary beneficiary of a clean environment then it should contribute financially to clean technology investment.

The action that led to the relocation of the coal processing plant has parallels with civil protest in the former socialist states of Europe and the former Soviet Union. While it is unusual political behaviour in Vietnam it may be a portent of more direct political communication between the local community and the elite as has been the case in Thailand. The following sections describe and explore other examples of civil initiative in Vietnam that relate to the environment.

4.5 Civil Society and Environmental Organisations in Vietnam

Environmental political action generally takes more subtle forms than described above. For a number of reasons only elite groups are involved in environmental action or are willing to

campaign for environmental goals. This section considers the cases of three such organisations: the Institute for Ecological Economy (Eco-Eco), the Hanoi Association for Conservation, Nature and Environment (HACNE) and the Centre for Resource and Environmental Studies (CRES). These three cases exhibit varying degrees of civil initiative and each have different structures and manifestos, although concern for the environmental impact of development and industrialisation is common to all.

The Centre for Resource and Environment Studies (CRES) based at the University of Hanoi and the Institute of Ecological Economy (Eco-Eco) are both effectively national, in as much as neither limits its activity to any one region. Indeed, CRES has a distinctly international flavour, if not focus, with many of its core staff working on various projects outside Vietnam. CRES actively networks with foreign organisations.

In the case of the founding members of Eco-Eco it appears that there may be a degree of alienation from the mainstream policy process which has motivated some members, particularly the retired academics and senior bureaucrats, to form the environmentally orientated organisation, while others have joined because they recognise the possible power advantages of associations with members of establishment influence. Members of these groups have communication access, not with the news media in a western sense, but more directly with policy makers[6]. Consistent with the theory of resource mobilisation, which is often used in the West to explain the formation of community based lobby groups, it is clear that the success of environmentally orientated groups in Vietnam hinges on the effective 'mobilisation' of well connected and therefore powerful human 'resources'. Most developing countries do not have the grass roots impetus nor the

[6]Professor Võ Qúy, former director of the Centre for Resource and Environmental Studies and a founding member of Eco-Eco hosts a weekly ecologically oriented television program produced by the state TV channel.

institutions of environmental NGOs to lobby politically. A theory of 'lobby' group activity in Vietnam can be grounded in the following unique developments.

4.5.1 Hanoi Association for Conservation of Nature and Environment

The Hanoi Association for Conservation of Nature and Environment (HACNE) is a provincial level environmental organisation and is concerned with both green and brown issues[7]. It is a Party sanctioned organisation and the office bearers on the management committee of the Association are identical to the office bearers of the provincial government agency, the Hanoi Environment Committee (HEC).

The Association is acting outside the direct influence of the central provincial government, forming its own agenda and soliciting membership and financial support beyond the State. The Association has a membership of over 400 (1993), with 17 office bearers, and was initiated on the basis of a newspaper advertisement. The first meeting attracted 158 people, indicating the interest of Hanoi residents to the issues of urban environmental protection.

The Association has developed numerous project proposals such as the 'Development of Green Space in Urban Ecosystem in Hanoi'. The proposal for this project was on HEC letterhead, the provincial government agency, and sought USD460,000 in funding. The proposed coordinating agency for this project was the Hanoi Environmental Technology and Investment Company (ENVIRCO), a wholly private company, the president of which, Đặng Dương Bình is the Secretary General of HACNE and the Vice-President of the HEC and Chief Environmental Inspector of Hanoi. As with many State Owned Enterprises (SOE's) this is an example of entrepreneurial development within the bureaucracy. It is difficult to establish what the result of such 'in-house' arrangements will be.

[7]Brown 'issues are those of industrial pollution and toxic waste treatment and disposal. 'Green' issues are those which include issues of conservation of natural areas and loss of bio-diversity.

Environmentally the management of these organisations is probably irrelevant. The management of the HEC did not see a conflict of interest and were completely transparent about the arrangement. Greenfield concludes that such arrangements are occurring throughout the party-state apparatus and technocrats are use their 'political authority, personal contacts and influence, control over information and inside knowledge to combine their position within the state with consultancies' (Greenfield 1993: 211). Such arrangements imply an obvious conflict of interest and therefore potential problems with environmental policy implementation.

HACNE's manifesto states that the organisation must become involved in the policy formulation process by 'joining in the building and carrying out [of] guidelines, policies, regulations and preventative measures', and 'contribut[ing] advisory opinion', and 'supplying options' to the Hanoi People's Committee (Personal Communication, Bùi Tâm Trung, President of HACNE and vice president of the HEC, 1992). The association lists its first 'duty' as '[C]ampaigning and concentrating all people's classes (sic), social organisations, [and] building mass movements to take part in the activities for conservation of nature and [improvement of the] environment in Hanoi' (Trung 1992). The Association sees itself as having a central role in environmental monitoring through the mobilisation of its membership. A straight forward recommendation based on the 'inside knowledge' of the association leadership that the official environmental watchdog, the HEC, did not have the resources necessary to adequately do the job. This particular aim of the Association is an example of a civil initiative, albeit sanctioned by the party, to replace a state function for the benefit of the broader community. It suggests that if there is no political will on the part of the government to provide funds, then a degree of voluntarism can be called upon.

4.5.2 The Institute of Ecological Economy

The Institute of Ecological Economy (Eco-Eco) describes itself as one of Vietnam's first NGO's, although permission to form was sought from the government by its founder, Prof. Nguyễn Văn Trương, on behalf of nine other scientists. According to another of the founding members, Trịnh Văn Trịnh, this procedure demonstrates the NGO status of the group because '[T]his means that our institute came into existence at the initiative of a collective of scientists, not through government action' (*Vietnam Courier* 1990: 8).

Nguyễn Viết Phổ, also a founding member, goes further to suggest that a parallel exists between the aims of their Institute and Green political parties in other parts of the world. 'In the advanced industrialised countries, people have rallied in support of so-called "green parties". Hence, these functions [are] to be fulfilled by Eco-Eco: to train competent personnel and popularise knowledge about environmental protection' (*Vietnam Courier* 1990, No. 9: 8). Eco-Eco, therefore, anticipates functioning like a Western environmental lobby group, at least as far as environmental awareness raising is concerned.

The Institute was founded on 6 January 1990, with the aim of contributing to the improvement of the socio-economic conditions of the people of Vietnam and to improve the ecological conditions needed 'for sustainable development'. The Institute has over twenty members who were all current, or recently retired senior bureaucrats with expertise in either science, agriculture, forestry, resource management, or economics. Despite the 'elite' nature of the membership, which is by invitation only, Eco-Eco acknowledges that '[T]he work to be undertaken calls for broad participation by the people' (*Vietnam Courier* 1990, No. 9: 8). It is clear from interviews with the founding members that Eco-Eco also perceives its role as one of a vanguard rather than the basis of an institutionalised popular movement (*Vietnam Courier* 1990, No. 9: 8).

The members of Eco-Eco are well connected and are all members of the VCP. The Institute's open questioning of the development direction of Vietnam at a most senior level is, to a degree, 'opposing' the legitimacy of the party's role as the development vanguard. Eco-Eco questions the potency of the State by suggesting that, despite regulations against de-forestation, the people have continued to flout the law and, therefore, without increased awareness about the ultimate cost of this behaviour the people will suffer. At the same time, Eco-Eco claims that the State must provide the cooking fuel necessary for the increasing population so that the people are not forced to break the law and cut wood themselves (Nguyễn Trong Chuan 1992: 3). Eco-Eco is therefore suggesting a strategy of increasing environmental awareness, in conjunction with a more positive response from the State.

The founding members of Eco-Eco claim that to secure an influential membership they deliberately approached 'key members of scientific associations and councils', and others who 'held responsible posts in State organs' (*Vietnam Courier* 1990, No. 9: 8). Professor Trương believes that the strategy of soliciting a broad, albeit horizontal membership, has 'influenced many localities and production units have come and asked for assistance in seeking solutions to the complex problems they face' (*Vietnam Courier* 1990, No. 9: 8). The other motivation for selecting members from a broad range of intellectual areas was a recognition of the interdisciplinary nature of any potential sustainable solution. Đường Hồng Đật, another founding member, who adds, '[A]lthough there exist various committees with an interdisciplinary character, such as the State Planning Committee, the State Committee for Science and Technology, etc., their activities are of a purely administrative character. In the fields of science and economic management, tight separation between the various disciplines is the rule' (*Vietnam Courier* 1990, No. 9: 9).

> State agencies have so far been dealing with ecological problems encountered by their respective branches. As for those which affect the whole country or an

> entire region or locality, they are neglected by those agencies (Đường Hồng Đật, Chairman of IEE's Science Council and former Vice-President of the State Committee for Science and Technology quoted in Jamison 1995).

The institute recognises the notorious lack of inter-agency cooperation in Vietnam and will therefore 'not duplicate the work of those branches, but raise it to a higher level, make a synthesis of it, and apply it to whole regions and whole localities' (*Vietnam Courier* July 1990, No. 9: 9).

Eco-Eco claims a significant degree of political influence.[8] Professor Dang Như Toan, Head of the newly formed Environmental Economics Department at the National University of Economics and a member of Eco-Eco, explained that the government pays a great deal of attention to this Institute. He did not cite specific examples but suggested that the group was in a position to inform the government directly. Ironically, Professor Trương described the Institute's main activity as preparing project proposals and trying to solicit foreign funding[9].

Eco-Eco's promotion of a more ecological development strategy is consistent with the environmentally sustainable and anarchic positions. Nguyễn Viết Phổ, of Eco-Eco, suggests that given the small land holdings Vietnamese farmers have in general, it is conceivable that the most efficient form of organisation is one of some degree of

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[8]Professor Trương, chairman of Eco-Eco, explained this influence to me in terms of the respect shown to him by the Prime Minister who had personally visited his house and presented him with a new flat in one of the new living quarters in recognition of Trương's work. Trương explained that he refused to live in the new flat preferring to reside in a couple of rooms in a larger house downtown.

[9]A recurring theme in Vietnamese research establishments is the solicitation of foreign funds and this occupies a disproportionate amount of time. The complete lack of local funding forces the issue. Groups such as Eco-Eco, CRES and HACNE are trying to focus on environmental action plan funding which is critical to implementation of much of their respective projects.

cooperation, if not collectivisation. This continues to be the case in those parts of Thanh Trì where aquaculture is practised commercially (see chapter 5).

Eco-Eco argues for the introduction of a national strategy of ecological economy in the rural areas of Vietnam to arrest the degradation of the land which the Institute blames on poor farming techniques. While Eco-Eco aspires to being able to provide a comprehensive model of ecological economy, it has not done so to date. Its work on ecological farming, however, does build on the experience of VAC. They acknowledge that the blueprint for a more comprehensive model integrating the whole economy, while vital, is more difficult.

4.5.3 The Centre for Resource and Environmental Studies, University of Hanoi

The Centre for Resource and Environmental Studies (CRES) at the University of Hanoi, is technically a research and post-graduate teaching centre. It is not, therefore, a non-government organisation, however, the activities of some of its senior staff has had significant impacts on environmental policy formulation in an informal context. The following section describes the importance of the centre and the 'political' impact of its co-founder and former director, Professor Võ Qúy.

Professor Võ Qúy founded the Centre for Resource and Environmental Studies in 1985[10]. CRES is the peak academic environmental studies centre in Vietnam. It has some interdisciplinary structures but is predominantly staffed by specialists in various biological sciences. This is a shortcoming in terms of the Centre's potential to contribute to

[10]Võ Qúy is considered by many to be the head of Vietnamese nature conservation. He has received various international awards for his work toward the protection of nature and has authored many books and articles on the subject (Kemf 1991: 832). The respect he commands in Vietnam is considered in chapter 6 and appears to be critical to his litany of environmental successes.

sustainable development programs because of the lack of broad interdisciplinary links with, for example engineering and sociology. Without such links, environmental sustainability and strategic concepts such as integrated catchment management, are more difficult to implement. Despite this, it has, in the past, operated not unlike a 'virtual corporation'[11], attracting specialists from other fields as required by particular projects.

The case of CRES is unique. As a university research centre, it is not a social movement but it is inextricably linked, in part, to the embryonic environment movement in Vietnam. The organisation acts as part of a broader network of conservationists. The former director, Võ Qúy, who retired in 1994 remains associated with many of the other national environmental organisations, and is a member of HACNE and Eco-Eco. CRES is a state-sanctioned body by default because it is part of a state funded university, however, a degree of autonomy exists which is not based on any formal connection to a branch of government. It represents another example of the informal network of power and influence that operates in Vietnam.

4.6 Discussion

The existence and behaviour of these organisations have the following implications for prospects for more sustainable outcomes. A strong model of SD would require a radical reassessment of the type of developmentalism that Vietnam is officially pursuing. The questioning of the development direction of the state by Eco-Eco demonstrates an indigenous and apparently influential position on the issue of SD. The historical influence of CRES, particularly during the directorship of Võ Qúy, provided an 'opportunity' for a degree of policy reform, such as increasing the likelihood of achieving high conservation goals.

[11]A current management term to describe an organisation that exists only for the duration of a particular project.

The nature and extent of civil society in Vietnam is contentious. The relevance of aspects of what might be a developing civil society, to sustainable development, are that decentralised local control has a potential to increase the prospects for development that is environmentally responsible to the community within which it occurs. The experience may be noted of protest in Eastern Europe, where local environmental organisations were established without state sanction, and the former Soviet Union where local environmentally motivated protest was arguably indistinguishable from protest about the nature of central control. In Thailand cross-class alliances were formed to protect environmental localities, these are all examples of this attempt by communities to gain control of their socio-environmental conditions. Generally, however the rapid economic development in most of Asia until the recent downturn has not had necessarily led to greater civil development as business, policy and resource control has tended to remain in the hands of the elites (Koppel 1998).

The experience in the former communist Soviet Union and Eastern Europe suggests that autocratic regimes, like the VCP, are more likely to tolerate the existence and actions of a group concerned with environmental issues than one openly concerned with political reform. This raises questions about the potential role of environmental activism in any political reform development. Instances of protest, such as that which occurred in Hông Gai, may contribute to a public consultation process outside of the local party membership. This would be a positive development in terms of SD. Most promising is the resurgence of the traditional local anarchic political orientation as suggested by Thayer 1991a & b. It is certainly the case that at least some aspects of Vietnamese society, such as traditional culture and religion, do not need any regulation by the state (Hoàng The Lien of the Institute of State and Law, Interview, 12 December 1992).

The ongoing restrictions placed on the activities of the Monks in Hue and the government forced disbanding of the Club of Resistance Fighters in 1989 are two examples of the VCPs intolerance of 'oppositional forces' (FEER 1990: 18). It is suggested that this is because the VCP regarded them as a 'direct threat to the party's mono-organisational grip on society' (Thayer 1991a: 15). On the other hand, the government has not reacted in the same way to 'oppositional forces' with an environmental component, such as the case of the Hông Gai protest. Perhaps this is because, as in the cases in Eastern Europe, concern for the environment is not perceived as opposition to state authority, or that as Hông Gai was a single issue case the party did not perceive wider political implications.

The central theme in the analysis of the socio-environmental problems of Quảng Ninh is the lack of effective communication between the various instruments of the State,[12] a theme that is common to analysis of governance in Vietnam in general. Whether this occurs horizontally between Ministries, or vertically between levels of government, the institutionalised rivalry, competition and information hoarding effectively cooperation. The Institute for Scientific Management (ISM) identify a 'lack of clear-cut assignment among the governmental agencies' (Bịch Tấn Sinh. 1994) as a contributing factor to inter-agency conflict and cites the example that agencies at different levels do not have clear authority to grant and regulate operating licences for mining in Quảng Ninh.

Organisations such as Eco-Eco and HACNE, it was claimed, had a degree of input into policy making. The senior officers of these groups claimed to have input at a very high

[12]A report by the Institute for Scientific Management identifies the 'legacy of the governments institutional arrangement in the central planning system' as central to the conflicts of interest today and the administrative nightmare of attempting to resolve these conflicts. Much confusion and conflict arises from the sheer number of different enterprises in the area. Within the province there are 14 companies controlling 58 enterprises (official and legal ones). The Ministry of Energy, for example, is operating 5 companies and 30 enterprises.

level, at least in an advisory capacity. Such examples provide supporting evidence of the state-society relationship in Vietnam, where influences from outside the government are limited to party members, or groups sanctioned by the Party and therefore dominated by the State. Although this does not correlate with the specific claim of the environmental organisation Eco-Eco that they are 'non-government'. Despite this, they acknowledge that the Party has sanctioned their existence. Members of both the Institute for Ecological Economy and the HACNE are either currently employed within the bureaucracy or have recently retired from it, which is consistent with Porter's view that 'all major decisions are made entirely within the bureaucracy' (Porter 1993: 101). Arguably, the political dimension of the environment in Vietnam to date, has been mainly of elite patronage and influence, rather than more populist forms of protest and dissent.

The Hông Gai protest described above involved a single issue and the 'protest' was apparently 'aimed' at the location of the plant, rather than at the government's policy of expanding the coal industry. The activities of Eco-Eco and HACNE, on the other hand, have long term agendas and are comparable to networking and other examples of horizontal integration that were the hallmark of the environment movement in Eastern Europe and the former Soviet Union. The positive response to the Hông Gai protest by the government is comparable to the tolerance of the environmental movements' various activities by the governments of Eastern Europe and the former Soviet Union. These activities were tolerated because they did not appear to be a political or ideological threat.

As described in chapter two the anarchic, social-ecological model of SD requires high levels of civic involvement and minimal central control. It is argued in this thesis that, although Vietnam has a tradition of local autonomy, operating beneath and adapting to central control, greater real autonomy is required. For example, economic rationalists would claim that 'public participation' per se is unnecessary as long as the actions of

individual economic agents, directed by Smith's 'invisible hand', make choices which will lead to sustainability[13]. A light Green or reform position would rely on 'participation' through the use of policy measures and regulation. That is, the sustainability goals of the government will be reached if everyone follows the policies, laws and regulations. The most 'sustainable' and radical positions require increasing degrees of 'participation', culminating in direct democratic decision-making such as Bookchin's (1980) anarcho-syndicalist vision.

For some in the mainstream development paradigm, the notion of community involvement may be politically unsavoury. For the technocrats, the prospect of involving non-experts entails either a slowing of the implementation stage or a degrading of the quality of the process, or both. In Vietnam '[S]uperior community interests have traditionally overwhelmed individuals rights, so that the individual dissolves into the community' (Gillespie 1994: 10). These interests, according to Gillespie, guide the district administration, through the peoples committees, to apply 'discretion which looks beyond individual needs to broader community interests (1994: 10).

4.7 Conclusion

The literature presents a number of case studies of the environment/development nexus as a politically evolutionary process. For example, Yanitsky (1990 and 1991) and Feshbach and Friendly (1992) have described the reactions of the State apparatus, to these eco-political developments in Eastern Europe and the former Soviet Union, as contribution, at least in part, to the political reform. These developments are relevant to Vietnam, because an embryonic eco-political movement is being established outside State controlled agencies.

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[13]Following the logic of Adam Smith's concept of an 'invisible hand' which guides economic decision making. The concept is synonymous with market forces.

The work of Yanitsky (1990 and 1991) and Feshbach and Friendly (1992) have described the reactions of the State apparatus to the eco-political developments in Eastern Europe and the former Soviet Union. There are certain aspects of these developments which are relevant to the case of Vietnam because of the existence of various environmentally orientated NGOs, such as Eco-Eco and the HACNE. These groups appear to be evidence of an embryonic eco-political movement. The relationship between the State and civil society, in terms of the environment, is complex and may manifest as a difference in opinion between State direction, as expressed by policy, and dissenting views, as expressed by the creation of non-government organisations/networks. This investigation into the influence of an *environmental* civil society in this thesis is not exhaustive, although it shows clear evidence of non-government influence over official policy.

In the former socialist countries, the various governments' neglect of environmental issues led to the development of the environmental movement. The traditional mass organisation could not respond to the increasing demands for an opposing voice. While the mass organisations were significant in a number of ways and did, over time, adopt a number of environmental positions and programs, the institutions were not able to mediate the various views that increasingly questioned the development direction of the state. The motivations behind environmental movements in Eastern Europe are threefold: firstly, as a reaction to the spreading environmental degradation, secondly, there was a progressive questioning of the ideology that delivered a 'substitution of growth for development' (Kos 1989), and thirdly, there existed what local authors have referred to as the 'echo effect', the influence from outside.

The rise of the local environment lobby group increased exponentially during the mid to late 1980s. These groups were based on opposition to a multitude of single issues that had a local impact, for example, the siting of noxious factories or waste dumps. Persanyi

(1989) concludes that these single issue groups were rarely based on any theoretical ecological perspective but were motivated by a NIMBY consciousness, which is typical of such groups anywhere.

Other common developments in environmentalism include:

- the number of organisations and the membership of these respective organisations increased.
- the environment movement became increasingly heterogenous
- despite a rapid increase in the numbers involved, the 'quality' of respective groups membership increased.
- as the reforms led to a proliferation of political forces and divergent agendas the environment movement had increasing difficulty in maintaining older networks and alliances.
- scientists, even those who are environmentalists, were respected by the state and non-state interests, as is the case in Vietnam.

The environmental NGO development in Thailand reflects a pattern which is common elsewhere and includes a range of types in terms of methodology of action and strategy. Some NGO's, according to Hirsch (1994), are reformist and mainstream and work with the State, others are more radical, locally focussed and tend to be oppositional.

The various factors which contributed to the emergence of environmentalism in the former socialist countries of Eastern Europe, and the former Soviet Union, and Thailand included the initial tolerance by the state and the use of environmental issues by some groups as mechanisms for political protest. This demonstrates how such a process can develop under authoritarian political systems. Such examples provide an important backdrop to the case of environmentalism in contemporary Vietnam.

The case of the protest over the expansion of the Hông Gai coal processing plant in Vietnam and the subsequent response by the government described above, not only highlights one of the dilemmas between environment and development, but also demonstrates the difficulties caused by the lack of interagency cooperation in Vietnam. This issue is explored in greater depth in chapter Five.

The relevant aspects of three environmentally focussed organisations in Vietnam, the Eco-Eco, HACNE, CRES have been described. The roles and features of these groups has been compared as part of an embryonic environment movement with the experience in the former socialist states of Europe and contemporary Thailand.

The following chapter explores the various issues that relate directly to the re-use of polluted water in the district of Thanh Trì.

Chapter Five
Environmental Strategy in Vietnam

5.1 Introduction

In this chapter various aspects of Vietnam's environmental management strategy are explored. The historical precedents to current policy are briefly described. The current key strategy for SD in Vietnam is the National Plan for Environmentally Sustainable Development (NPESD) (SRV 1992b). This strategy is analysed with reference to relevant sectoral examples including; agriculture, aquaculture, clean technology, water resources, environmental health and environmental law.

The environmental policy formulation process in Vietnam is examined with an emphasis on those aspects which will limit opportunities for a sustainable outcome. The implication of 'international' influence is also considered where it is argued that if Vietnam persists in a mainstream approach to environmental policy it will placate the international organisations that have intervened on the issue of environmental policy, but ultimately it will not improve prospects for SD. The structural limitations of incrementalism and technocracy are presented within this chapter and examples of opportunities for informal policy approaches are examined. The potential of integrated water treatment, re-use and food production is considered as the 'ideal' strategic option for Hanoi.

5.2 Historical Precedents to Current Environmental Policy

The reality in Vietnam is that the government has embarked on a mainstream reformist sustainable development strategy, embodied in the NPESD. This strategy is fundamentally weak with regard to a social-ecological perspective because it does not address the structural causes of pollution and resource depletion. It also has a number of more specific sectoral weaknesses which are examined below. It is stated in the preface of the NPESD,

tabled in August of 1991, that 'the issue of natural resources and environmental protection is an important one in Vietnam'. This view had been recorded in 1985 in the Council of Ministers Resolution No. 246, which supported the rational use of natural resources and the protection of the environment. Although the opening of the 1991 report does not specify the motivation behind such a position, it claims that the government of Vietnam was concerned about the 'future demands that economic development would place on the environment' (SRV 1992b), therefore, the government requested the assistance of the United Nations Development Program (UNDP) to hold an international conference on the environment and the concept of SD.

Professor Võ Qúy, a leading Vietnamese environmentalist, warned that,

> the scope of the environmental damage requires the Vietnamese people, if they want their country to escape gradual extinction and make steady progress, to work out an all-round and rational development plan (Rollason 1991).

There is little local criticism of the government's stated development direction, which, given the political culture in Vietnam, is not unexpected. The most critical, on the issue of SD may be the Director of the Institute of Philosophy, Assoc. Prof. Dr. Nguyễn Trong Chuan (1992) who wrote that the 'awareness of policy makers and strategy designers at a central level is inadequate'. Although Nguyễn Trong Chuan notes, as an example of positive policy development that has occurred in Vietnam, that there has been the transfer of exclusively state-based forestry to community or social forestry. This places the responsibility locally and builds in an incentive for sustainable management practices. This development, away from central planning, is consistent with the anarchic concept of de-centralised control of resources.

In terms of government policy the environment in Vietnam has only recently become a significant issue, however, it is claimed within a number of official documents, the 1985 National Conservation Strategy (NCS)[1] and the (NPESD) (SRV 1992b), that there are examples of the government of Vietnam's historical commitment to the environment. The NCS, for example, cites President Hồ Chí Minh's 'Plant a tree for Tet' movement which started in 1959, as an example of a tradition of government commitment. At the time, President Hồ Chí Minh quoted a Vietnamese saying, 'Forest is gold, sea is silver', to which he added, 'Forest is gold, if we know how to conserve and use it well, it will be very precious' (SRV 1985: 3).

The NCS (1985) of Vietnam was the first national environmental statement of potential policy direction[2]. The tone of the document and the views of its authors were clear from the opening paragraph of the executive summary which reads:

> [A]fter an evaluation of the numerous factors relating to the environmental conditions in Vietnam, and an analysis of the current trends in the utilisation of the natural resources in the context of rapid population growth, the Committee for the Rational Utilisation of Natural Resources and Environmental Protection (program 52-02) is of the firm conviction that *what Vietnam faces today is a grave ecological crisis'* (NCS [draft], SRV 1985 Emphasis added).

The summary continues with the projection that at current rates of deforestation all natural forests in the country will be destroyed soon after the turn of the century. Such an outcome would lead to environmental consequences such as increased frequency and intensity of

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[1] The Vietnam National Conservation Strategy was published in June 1985 in draft form after preparation by the Committee for Rational Utilisation of Natural Resources and Environmental Protection (Program 52-02) with assistance from the International Union for Conservation of Nature and Natural Resources (IUCN). The NPESD (SRV 1992b) was written with the assistance of the IUCN, UNDP and UNEP.

[2]Professor Võ Qúy, former director and co-founder of CRES, founding member of Eco-Eco was one of the authors of the NCS.

flooding and drought, with consequent crop destruction, which will have severe impacts on both food security and the economy, as well as increased crop damage from typhoons and siltation problems associated with any of the proposed hydro-electric schemes. This doomsday like prophecy suggests that such mass environmental disruption in the rural areas will lead to overcrowding in the cities, '[I]nternal strife will be precipitated and national security weakened' (ibid). Although reforestation programs have begun, there continues to be a massive net loss of forest cover.

The prospect of weakened national security is very powerful given Vietnam's history and indicates the seriousness of such a sentiment. While the physical results of deforestation are well documented elsewhere, and deforestation has been linked to increased transmigration to urban areas in other countries, including Thailand and Malaysia, the concept of civil unrest and weakened national security expressed in the NCS could be viewed as a cynical attempt to place the 'grave ecological crisis' in terms Vietnam's leadership may better comprehend. To avoid this 'alarming scenario', the summary of the strategy suggests that a new conservation ethos is necessary, and suggests that this can be achieved through implementation of the main recommendations which are: a zero population growth rate[3]; a massive reforestation program; and the establishment of a National Board of Environmental Coordination, with wide cross sectoral powers to 'enforce new environmental legislation and regulations' (ibid).

The NCS recommendations were based, predominantly, on the World Conservation Strategy (IUCN, 1980). The NCS was written first in English (1985) and was not translated into Vietnamese until the following year. In the post-WCED period, and given

[3]Neo-Malthusianism is a common theme in mainstream environmental strategies. The view tends to blame the dis-empowered by default because neo-Malthusianism focuses on population growth rather than on the structural injustices of current generally inequitable wealth distribution.

the definition of SD provided by Our Common Future (WCED 1987), a more sophisticated strategy was required.

5.3 The Current SD Strategy

5.3.1 The National Plan for Environmentally Sustainable Development (NPESD)

The following section describes the origins and goals of the NPESD. Following this is an analysis of the sections of the NPESD relevant to the case study of water management and re-use presented in chapter Five and, finally there is a discussion of the issues which limit the potential of policy. The NPESD is the key strategy for Vietnam to achieve the goals of SD identified by the government. There are, however, a number of aspects of the strategy that weaken its potential for SD. These aspects include the nature of its formulation and the data upon which it has been based. The methodology of the proposed implementation is flawed, and some of the fundamental goals of the strategy are not sufficiently radical to satisfy the most environmentally benign views.

The strategy assumes that the most appropriate way to achieve SD is through a prescriptive top-down centralised policy enforced by the state. Some commentators on the environmental policy situation in Vietnam, who might be described as light green eco-socialists, believe that SD will only come about under a strong centralised state structure (for example, Mai Đình Yên 1992, Beresford and Fraser 1994) There was a perception in the former socialist countries of Eastern Europe and the former Soviet Union, for example, that they should have a comparative advantage in terms of environmental protection over the West since the strategies necessary to facilitate environmental progress depend on 'strong coordinating institutions' (Kos 1989: 9). This chapter argues that while some aspects of environmental management can be well served by strong state regulation, the efficacy of this depends on mechanisms such as sound inter-agency communication and

unrestricted information flows, both vertically and horizontally, as well as culturally appropriate and enforceable environmental law. Likewise it can be argued that the environmentalism that has been the basis of policy formulation in the West has a long tradition based largely on a culturally specific aesthetic which is not the case in Vietnam.

5.3.2 NPESD: Structure and Background

The NPESD is a strategy for policy action until the year 2000. In environmental policy, the most frequently agreed goal is that if damage is occurring to the resource base it should be minimised or eliminated. The NPESD's goal is to address the issues raised in the NCS. The objectives of the plan are:

> 1) to provide for the gradual development of a comprehensive framework for national and sub-national environmental planning and management; and
>
> 2) to lead to specific actions that are required in the short term to address priority problems at their very roots.

The NPESD is 'not intended as a detailed blueprint for action, but as a list of activities that need to be attended [in order] to attain environmental sustainability' (SRV 1992b: 23). The strategy was based on the NCS (1985) which, as suggested above, borrowed heavily from the World Conservation Strategy [WCS] (IUCN, 1980). The WCS was an agglomeration of ad hoc environmental ideals from the International Union for Conservation and Natural Resources (IUCN), Worldwide Fund for Nature (WWF) and the United Nations Environment Program (UNEP).

The resulting draft document was presented for comments at the December 1990 conference and ratified by the State Committee for Science (SCS) on 12 June 1991. The SCS is responsible for implementation. The creation of the Ministry of Science, Technology and Environment (MOSTE) was one of the recommendations of the NPESD

(UNDP 1993: 4). Making this ministry alone responsible for the implementation is one of the barriers to reformist environmental management, because it tends to marginalise the environment as a separate issue that can be dealt with by one section of one ministry. This approach does not embrace the holistic and integrated nature of both the environment as an issue, or the integrated nature of a sustainable strategy. Consistent with a bureaucratic perspective is acknowledgment within the ministry that the MOSTE minister was quite junior and of lower status than the ministers of finance and other 'economic' portfolios. The MOSTE is considering SD and seriously looking for solutions, but the extent to which the notion is being considered by other ministries is very limited (Nguyễn Dac Hy, MOSTE, Interview 23 September 1993). The lack of authority of the ministry may be lamentable from an authoritarian perspective, but may conversely facilitate grassroots response to local environmental health threats. A lack of state interference may allow the civil space for local solutions.

The objectives of the NPESD clearly indicate an incremental approach with the proposed 'gradual development' of a framework. The NPESD is, after all, a strategy rather than a fully developed policy. As such, it represents something of an ideal, based as it is on an 'ideal' environmental policy imported from outside Vietnam. This phenomenon of policy importation is the second significant weakness of the NPESD and is considered in the section 6.5.1 below.

The specific objectives of the NPESD reveal evidence of a rationalist perspective. For example, the first of the five specific objectives is:

> to maintain essential ecological processes and life-support systems upon which human welfare in Vietnam is dependent. (SRV 1992b)

While this objective seems perfectly reasonable and sound, it assumes that only some ecological processes are 'essential' to human life. The report does not define 'essential', which raises important questions about the agreement of goals in situations where the sacrifice of an ecosystem is necessary for development. It further assumes that those processes that are 'essential' can be isolated in time to maintain them. It would appear that the first use of the phrase 'essential ecological processes' was in the WCS (IUCN, 1980) of 1980, and is first quoted in a Vietnamese publication in the NCS published in 1985. This goes against the fundamental ecocentric SD principle relating to the interconnectedness of all systems, regardless of scale and their 'apparent' connection to anthropocentric priorities and is, therefore, inconsistent with a social-ecological position.

The second of the stated specific objectives is:

> (to) maintain Vietnam's wealth of genetic diversity of both domesticated and wild species of current and potential benefit. (SRV 1992b)

This statement implies that for genetic diversity to be valid it must have some anthropocentric potential benefit, but the use of a conservation ethic should be maintained as a precaution until this potential can be realised. This is consistent with a social-ecological and precautionary approach.

5.4 NPESD: Sectoral Analysis

The following section considers aspects of various sectors of the NPESD which have a direct bearing on this case study. In this thesis, it is argued that greater degrees of sustainability are only possible when the principles of integration and interconnectedness inherent in social ecology are recognised. The government of Vietnam is using the recommendations of the NPESD as the basis for its SD strategy. Therefore, the following section considers the application of the specific recommendations of the NPESD to

agricultural, fisheries, aquacultural, water resources, clean technology, and industry sectors, in terms of barriers to or potential opportunities for greater SD.

5.4.1 Water Resources

The watersheds of Vietnam are, according to the NPESD, already seriously degraded by poor land use management. Clearly these practices must change, however, as mentioned above, other than to reiterate the need for change, the NPESD does not provide any concrete methodology. The NPESD highlights a number of areas in regard to water resources, including watershed degradation from deforestation, inappropriate cultivation within the catchment, and the pollution of surface and ground water from sewage, industries, and agrochemical use, and recommends that an integrated watershed management strategy be given high priority. The difficulty of formulating such a management strategy for the Red River Delta is the sheer complexity of activities within the watershed. The theoretical model of ideal watershed management such as Total Catchment Management has not even been achieved in countries with greater environmental budgets and better inter-agency cooperation than in Vietnam. Such models would be extremely difficult to implement in Vietnam under the current institutional conditions, although informal cooperation within the catchment may be the best hope of improved SD outcomes and the most politically appropriate within an anarchic model. (see section 5.6 below)

The NPESD confirms the growing concern about the increasing pressure on receiving waters from expanding industrialisation. The NPESD strategy for water resources seeks to:

> [E]nsure that a high priority is placed on integrated watershed management, promote the prevention of water pollution via standards and controls on industrial effluents, proper sewage treatment and adopt water quality standards in relation to particular uses, eg. drinking, recreation and fishing etc. Ensure that water resource planners remain informed about future land use plans eg. for industrial development, mining, etc. So that the development of new water supplies can focus on sources that are least likely to become polluted in the future (SRV 1992b: 45).

There are a number of issues raised by the above 'ideal' strategy that impact on prospects for improved SD. Firstly, the notion of integrated watershed management while admirable and critically important for a sound environmental outcome, has proved impossible to implement on any significant scale anywhere in the world. The NPESD definition of integrated water management is based on the neo-Malthusian notion of carrying capacity, which, by definition, assumes an arbitrary formula of what that capacity might be, although the report does not specify what this is. Likewise, the pollution impact of a given population size on a watershed depends less on the size of the population and more on the nature of their activities. Focussing on the size of populations is neo-Malthusian and therefore planners, perhaps inadvertently, tend to blame those who are poor or those least able to change the situation.

5.4.2 Agriculture

Consideration of the NPESD recommendations on agriculture is relevant because of the critical importance of food production within a socio-ecological SD model. The NPESD stresses the importance of agriculture only in terms of its contribution to national income (49% of GDP) and employment (62% of workers). According to the strategy, increasing agriculture is, therefore 'critical as a means to improving presently inadequate nutritional levels and overall quality of life' (SRV 1992b: 41).

The strategy stresses the need for agricultural intensification, although it is clear from recent experience that poor farmers in marginal areas will tend to increase the size of plots in order to boost production, rather than increase the intensification of their methods. It is the recommendation of the NPESD that incentives to increase production be applied, such as have already apparently occurred as a consequence of the land tenure reform post *Đổi Mới*. Systems such as VAC type agroforestry, while of the highest order of sustainability and with the least environmental impact, require a degree of capital investment at the

establishment stage. The issue of the availability of capital is not considered in the strategy, nor is the way in which the lack of capital becomes a barrier to environmentally sound techniques such as VAC.

A further barrier to the implementation of more sustainable farming systems, such as VAC, is the time delay for the various longer maturing species such as trees, to be established before harvesting can occur. The system relies on diversity and an integration of appropriate species. For example, for birds to act as an insect pest control the appropriate bushes and trees must be planted to provide habitat for the birds. It may take some years for the trees to grow that will provide both bird habitat and fuel wood.

One of the strengths of the NPESD is that it rejects the concept of 'economies of scale' which favours larger, monoculture farming. Instead, the NPESD supports the World Bank suggestion that 'attention to small-scale processing promises the greatest overall improvements in productivity' (SRV 1992b: 41). The NPESD can be interpreted as being supportive of a scheme such as the Mai model, if combined with the techniques of VAC, particularly if the focus is on the potential involvement of individual families through the catchment. (see section 5.7 below)

The VAC system is a Vietnamese version of the principles of permaculture. The system is a highly managed and relatively closed ecosystem. The 'system' is a combination of field crops, trees, vegetables, livestock and a household pond. The combination of field crops and trees is a principal feature of agroforestry. Combining these production methods is perhaps the most sophisticated form of whole farm management yet devised. By definition the system also applies the mechanism of integrated pest management. The system generally focuses on the opportunities for improving production on small plots of land, therefore the concept of agroforestry or permaculture is particularly relevant to the current

land reform situation in Vietnam. The VAC model comes in a number of forms specifically adapted to the predominant conditions in different regions. The central VAC concept is that of integration, where the use of a number of farming techniques together on a small holding has synergistic benefits for the overall production. The actual methods used in a VAC system are similar in concept and aims to those described in Australia as 'permaculture' (see chapter Two) and include the principal mechanisms of shelter belts, nutrient cycling, biological pest management and zero tillage. The physical parameters of soil, nutrient, energy and water conservation are central aims of all these systems. In Vietnam, the 'system' has been adapted by academics (Lê and Rambo for example) and VACVINA[4] (Gardeners Association) to the various climatic and soil conditions throughout the country (see section 6.7 below).

5.4.3 Fisheries and Aquaculture

According to the NPESD, the potential production of Vietnamese fisheries is estimated at 20-30 thousand tonnes per year. The strategy states that some effort is being made to increase inland fisheries to improve the protein supply for communities that live at some distance from the sea. The strategy notes that as inland aquaculture is closely associated with rice and other horticulture, and these traditional agricultural techniques have become increasingly dependent on agrochemicals, that significant chemical contamination of aquacultural products has occurred.[5] The strategy's recommendation against the use of agrochemicals, for example, is consistent with the best environmentally benign agricultural management practices.

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[4]VACVINA is the national gardeners association. In some areas the Association has merged with the farmers association and in others it is independent. It is technically a mass organisation under the 'umbrella' of the Fatherland Front. The extension and promotion of VAC is carried out by the Farmers Association and VACVINA.

[5]There is also a lasting legacy of herbicide contamination from the war which will take many years to resolve.

Pollution by agrochemicals or industrial waste limits the immediate potential for aquaculture and highlights the necessity for integrated catchment management. Ironically, the integration of rice and fish has enormous potential for multi-cropping and intensive food production, but to be sustainable these processes must be carried out in conjunction with the principles of 'whole farm management' which has, as central features, biological pest control and zero chemical use. Such notions are consistent with the sustainable types of agricultural development.

The key elements of the fisheries (inland) strategy which are relevant to this case study are the promotion of aquaculture as a means to increase protein availability and create income generating-opportunities, and moves to discourage the use of potentially harmful agrochemicals in favour of other pest control systems, particularly in areas where there are freshwater fisheries, all of which are important (see section 6.4.4).

The NPESD fails to connect the issue of organically rich wastewater with the potential for increasing aquaculture production on a macro level, although on a micro level the concept of VAC does specify the role of wastewater in pond production. This is a serious barrier to a wastewater re-use program developing incrementally from the NPESD, as the broader opportunity has, to date, been overlooked.

5.4.4 Clean Technology in Industry and Agriculture

All industrial processes create a degree of waste. This can be in the form of liquid, gaseous, solid or thermal waste products. All these forms of pollution have negative impacts when released into the environment (see chapter 6). The single greatest barrier to the safe use of wastewater is the impact from industrial pollution. In an anticipation of the expected rapid increase in industrial development in Vietnam, the NPESD requires the application of 'Clean Technology' (CT) to all industrial processes. All currently polluting

processes should apply the principle of CT by using zero-waste processes. Instead of implying that these ideals should be implemented, the strategy compromises by suggesting that the principle of 'Best Available Technology that is Economically Appropriate' (BATEA) apply instead. The strategy does not specify whether incentives or penalties will apply in order to implement CT, but regardless of the final policy, the provision of BATEA means that industry can claim that pollution reducing technology is too expensive to incorporate[6]. Furthermore, such a concept reinforces the development discourse which categorises some technologies as 'appropriate' and, conversely, some as 'inappropriate'. This notion is supported, albeit reluctantly, by the technocracy of the provincial environment agency, the HEC, who concede that even a partial application of CT is better than the current situation. The application of CT to industry in Vietnam is crucially important for a more sustainable outcome.

There is also a tendency to overlook traditional technologies which may be 'cleaner' when compared to newer, more polluting technologies. When this happens the economic burden is two-fold because, not only is more sophisticated technology generally more expensive, but it may also require expensive pollution controls. For example, in agriculture the use of nitrogenous fertilisers is a more recent technology than the use of organic waste[7] and 'green' fertiliser such as legumes, however, the application of nitrogenous fertiliser has not only a detrimental effect on the fertility of the soil in the long term, but also creates a nitrogen-rich run-off which becomes pollution downstream (see chapter 6). If technological solutions to the fertiliser run-off problems were mandatory, the use of the fertiliser would become uneconomic. Therefore, given the option under BATEA, farmers

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[6]Recent experience suggests that the penalties of closure is being exercised as a number of offending factories have been closed down. (URL: http://coombs.anu.edu.au/~vern/avsl.html.au 1997)

[7]According to the Vietnam Living Standards Survey 1992-1993 49.71% of rural households utilised domestic rubbish as fertiliser (SRV 1994).

will not be obliged to prevent the pollution. If, on the other hand, the farmers were required to meet the principles of CT, they are likely to pursue lower cost options such as the traditional organic 'green' fertilisers and the principles of co-planting with legumous trees and plants, which is a feature of the agricultural models such as Mollison's permaculture.

The introduction of 'Clean Technology' would reduce the creation of waste and increase the potential to recycle all waste within the production process (or some other production process). The application of CT and zero emission processes are critically important to a better environmental health outcome in urban/industrial areas. If hazardous material is produced, ideally it must be treated to safe levels on site, or at worst, a number of factories within an estate should have a single treatment system. This latter option could have economic advantages but introduce management problems. Likewise, the soap and detergent factory which currently discharges into the Tô Lịch River should have a treatment system on site. The UNDP has current programs to increase awareness in the Vietnamese industrial community about CT, but while this may have some tangible benefit in the future, support is needed now to encourage SOE's and ex-SOE's to recommission the existing on-site treatment systems.

5.4.5 Environmental Health

One of the action programs under the urban development section of the NPESD acknowledges that the sewerage system in Hanoi is completely inadequate (SRV 1992b: 69). The action plan suggests that the wastewater treatment process that occurs in the various ponds around Hanoi should be expanded to include the production of water hyacinth for commercial purposes, such as animal feed. The strategy appropriately urges caution about such a venture although it does not state clearly that water hyacinth are known to be very effective in removing heavy metals from polluted water. The metals are

trapped within the tissues in the plant and can enter the food chain if the plant material is then consumed or used as green manure, as suggested by the action plan. For water hyacinth to be part of a sustainable outcome, CT would have to be fully operative and heavy metal contamination of the ponds and streams below an acceptable level.

The urban development action plan of the NPESD acknowledges that Hanoi is expanding, and there is an increasing amount of building of dwellings and other structures on illegally reclaimed ponds and drains. Subsection (j) under the action plan section on Environmental Health (SRV 1992b: 73) supports the notion of increasing the capacity of the urban ponds to assist in flood mitigation and to (under subsection (i)) '[D]evelop an integrated aquaculture plan for Hanoi to maintain the utilisation of the bio-treatment capacity of the water bodies and to prevent the collapse of the aquatic ecosystems'. (SRV 1992b: 72) Further, and consistent with the principles of a permaculture concept, the action plan notes that such an outcome would 'also help to maximise the recirculation of resources and organic matter' (SRV 1992b: 72). As with the other section described above, the NPESD does not provide any detail as to the actual strategy for implementation nor does it acknowledge the necessity for high levels of integration, cooperation and investment. Such a view has been developed further by Professor Mai Đình Yên at the University of Hanoi (see section 6.7 below).

There have been similar proposals by the Hanoi Drainage Company for the construction of more pond capacity in northern Thanh Trì to regulate flood peaks and provide a pond-type wastewater treatment system for Hanoi (Nhuệ and Nguyễn 1990: 110-111). Indeed, all the recommendations by the drainage company can be described as very sustainable, as they are low energy, low cost, low maintenance and low impact options.

The Hanoi Drainage Company, the policy implementor, recognise that the following improvements could be made with limited funding:

• the provision of on-site septic treatment for high rise flats.

• the use of ponds in the older areas of Hanoi as treatment lagoons in combination with aquaculture.[8]

• the on-site treatment of all wastewater from industrial plants,. which is one of the foundation principles of 'cleaner production'. Some factories in Hanoi were built with treatment plants but these systems have failed and are not being repaired.

• the construction of regional, small scale, wastewater treatment plants on each of the main drains.

The Drainage Company suggests that the following should be implemented :

• all new living quarters should treat sewage within the estates with biological systems such as septic tanks

• older living quarters should utilise existing ponds and increase the level of management with a view to improve water quality and potential productivity

• all factories must have their own on-site treatment

• all hospitals should have double treatment facilities that sterilises output

• all lakes and ponds within and around the city should be managed to increase the level of dissolved oxygen (DO) and therefore the potential for fish farming.

5.4.6 Environmental Law

To address the issue of penalties, the NPESD proposed that a National Environmental Law be promulgated as soon as possible. A group called the 'Working Group on Environmental

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[8]The Hanoi Environment Committee stated that there had been an attempt to improve the water quality of Hoàn Kiếm lake by stocking it with fish. The fish were gone within weeks, locals fished for them or netted them for food.

Protection Law' advised the Ministry of Justice on the content of the Environment Law. The membership of the Working Group included Lê Thuc Can and Dr Huu from the former State Committee for Science, and various staff from CRES at the University of Hanoi, and a number of other environmental scientists and lawyers from the Ministry of Justice. The International Union for the Conservation of Nature (IUCN) organised a group of international specialists to scrutinise the first draft of the Environment Law for Vietnam (UNEP 1990). This is a further example of the 'importation' of environmental policy, apparently based on the perception identified by Dr. Hoàng The Lien, that 'at the moment in Vietnam we do not have enough technical experience to deal with the 'new' environmental problems such as industrial waste. So you see as lawyers we ask the specialists, the scientists, to advise on the standards to be included in the law' (Hoàng The Lien, Director Law Institute, Interview, 2 January 1993).

A second draft of the law went to all provincial governments for comment and some objections were lodged by the provinces at this stage. The third draft was circulated to all national ministries. The passage of the law was delayed due to the number of objections expressed by various ministries, particularly those which would have been affected by the provisions in the proposed law. The environmental law was finally passed 10 January 1994 after some 112 changes at the instigation of the other ministries. MOSTE sources claimed that many of the ministries that had insisted on watering down the environmental law owned or controlled some of the most polluting of the factories and were, therefore, concerned for the welfare of 'their' enterprises.

The environmental law contains the following pollution control provisions:

- Prohibitions against discharges into the atmosphere and waterways beyond unspecified 'permissible limits'.
- Waste management and treatment of hazardous waste.

• Allocation of pollution control responsibilities among a number of different agencies including a central National 'EPA' type agency[9], which would prepare national regulations and standards, although these regulations and standards are not clearly specified.

• The establishment of Provincial Environmental Committees which will become the implementing bodies and generate local regulations with the authority to enforce them[10].

After the promulgation of the Law on Environment Protection, a new local environmental agency was formed from within the former Provincial Committee for Science and Technology, called the Science, Technology and Environment Department (STED)[11], mimicking the name of the new National Ministry of Science, Technology and Environment (MOSTE). The establishment of provincial level environment authorities was first proposed as part of the NPESD strategy. As such, it represents a degree of decentralisation, at least to the provincial level[12]. The ISM claims that, despite a high level of environmental awareness amongst the officials in the STED, little has been done, because a number of environmental regulations are not yet in place, and, secondly, as

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[9]The National agency is the Department of Environment and Natural Resources, which is a branch of the MOSTE.

[10]In February 1992 Yeltsin signed in new environmental legislation that allows individuals (including local authorities) the right to sue polluting SOE's for damages. Importantly the law made the actual enterprise responsible rather than a distant ministry.(Herald-Sun 1992) Despite the strength of the law if 'strictly enforced, the law would shut down 80 per cent of the countries factories overnight'. A principle barrier to effective implementation in Russia, which is common to the situation in Vietnam, is the lack of trained lawyers familiar with environmental law.

[11]Part of the role of the STED is to oversee the environmental regulation of the coal industry and to coordinate inter-sectoral environmental protection activities. The STED are also responsible for administering EIAs for investment programs. Currently the STED are working with other local agencies to improve the inter-agency coordination of environment and related issues These other agencies include, for example, the Centre for Preventative Health, which provides equipment for water quality testing.

[12]There are a number of examples of increasing decentralisation in the Vietnamese system of governance. For example the administration of the 1988 land reform process by the cooperatives (Fahey 1994: 348) and the establishment of provincial level environment agencies. Fahey suggests that at least part of this decentralisation process has been to provide incentives for local revenue raising by, for example, encouraging customs officials who had previously not bothered. Revenue raising provides local authorities with greater incentive to collect.

environmental management is a relatively new field, there is a lack of knowledge and suitable monitoring equipment. This is typical of the situation throughout Vietnam.

The STED committees are responsible for provincial-level implementation of pollution control measures and arbitration of any pollution-related disputes. The provincial committees set environmental education agendas for the province. The Council of Ministers has ultimate responsibility to oversee the inspection activities. It is not clear how this provision, if it were necessary, is to be implemented.

For every law promulgated, the Ministry of Justice's Propaganda Department concentrates their educational efforts in those areas which are most effected by the problems that the law is designed to alleviate. For example, the anti-pollution law will be 'pushed' in the industrial areas.[13] Likewise, the Ministry of Science, Technology and Environment (MOSTE) must develop materials about the environment for the Ministry of Education to disseminate to schools. This is in recognition of a low level of environmental awareness throughout the community and the consequent expectation of difficulties in enforcement of environmental regulations (Nguyễn Dac Hy, MOSTE, Interview, 23 September 1993).

The constitution has several provisions concerning the environment and natural resources. For example, in provision 29 'every government organisation, every economic unit and the army and all individuals should follow the provisions of the state law on environment and natural resources' (SRV 1992b). The Ministry claims it would close any factory that was found to be violating environmental pollution standards. Indeed, most factories are discharging higher levels of waste than permitted by the standards, however, no factory had been closed on those grounds until February 1997 when at least 60 factories and brick

[13]Interview with Mrs. Tang, Ministry of Justice. She was part of the Environmental Law Working Group. She is predominantly involved in the law relating to Marine Resources.

kilns where ordered closed when the operators failed to comply with the environmental standards (Weitzel 1997)[14]. In the case of foreign or non-government owned factories, the Ministry would request that they change the offending process that leads to the pollution.

Evidence of environmental management at a national level is indicated by an instruction from the Prime Minister, to the effect that all development projects must include an assessment of the impacts on the environment within the feasibility study (Bịch Tấn Sinh. 1994). Development projects, including foreign cooperation and investment projects, will have to include in their feasibility studies an assessment of the impacts on the environment[15] (*Vietnam Courier* 1993). At the same time, the Prime Minister called for local authorities to 'restrict and control' water and air pollution. Importantly the Prime Minister's decree required that environmental considerations be included in the planning process. For this to be truly effective it must occur at a strategic level and be included early enough in the planning process for any real environmental benefits. The creation of effective environmental management institutions, regulations and policies was central to the aims of the 1991-95 Environment Protection Program instituted under the recommendation of the NPESD (Lê Thac Can 1993: 9).

Environmental law in Vietnam is being applied, with recent evidence of forced factory closures, however the nature of the legal system and the tradition of regulatory avoidance suggests that the 'stick' approach to environmental regulation will not lead to higher degrees of actual sustainability. Therefore environmental and SD policy, if appropriately

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[14]One of the central limitations of similar measures in former socialist Europe and the Soviet Union was that the State acts as both environmental destroyer and environmental watchdog.

[15]Order # 73, issued 25/2/93 and includes greater attention to Joint Ventures and environmental impact in general.

formulated, will need to include a range of implementation strategies. The following section considers some aspects of the policy formulation process in Vietnam.

5.5 Barriers to SD: Weaknesses in Environmental Policy Formulation

A number of factors that occur during policy formulation can contribute to barriers to greater SD. The following section considers the importation of environment policy concepts as a barrier to successful implementation in Vietnam. Also the nature of policy making is considered in light of the policy-making experience in Vietnam.

5.5.1 Importing Environmental Policy: A Barrier to SD

This thesis poses the question of whether the importation of environmental policy is a potential barrier to ecologically sound development or not. For example, can policy formulated in a post-industrial, rich country be transferred successfully to an almost pre-industrial, poor country and be implemented with the same efficiency?

One of the central barriers to SD, at least to reformist outcomes in Vietnam, is the failure of ecologically sound policy to be formulated. One of the impeding factors in this process appears to be the cultural origin of the policy. It is clear that many of the policy ideas and structures that have shaped environmental policy and legislation in Vietnam have come from outside, particularly from western, cultural traditions. The potential barriers inherent in imported policy are numerous. Firstly, on a philosophical level, policy generated in another culture is more relevant to the social mechanisms and mores of that other culture. Secondly, and more importantly, on a practical level, the original policy may rely on a legal system where notions of law, ownership of property, and other rights are fundamentally different . For example, in Vietnam the notion of ownership, property and related law is unfamiliar to most people. Another factor is that superimposing a 'foreign' policy model

will obliterate an opportunity to develop a more workable, implementable and comprehensible indigenous policy framework. A locally developed, culturally appropriate, environment policy framework would lead to a more environmentally sustainable outcome because of the increased likelihood of successful implementation.

Even within the country, difficulties with implementation occurs because of a resistance to 'non-local' ideas. For example, the experience of CRES staff when they established an ecologically sustainable agricultural system in the highlands as a 'model farm,' was that the crops were destroyed and the buildings graffitied with negative slogans. The local people were not enthusiastic about the new system. The director of CRES, Professor Võ Qúy, believes this had more to do with the way it was demonstrated than the system itself. The experience was repeated before a new consultative approach was taken. The team received very little support from the local authorities who were not convinced of the advantages of the system. This incident was cited by some academics as an example of the need to convince the Party leadership in order to guarantee implementation. Professor Mai Đình Yên of CRES acknowledged that policy implementation is one of the advantages of an authoritarian single party system.

Similarly, a potential barrier to new cooperative management of common resources is the legacy of the declining quality of management of the cooperatives in the years prior to *Đổi Mới*. Many peasant farmers may be disinclined to place trust in an apparently similar structure, particularly as many of the those involved in the former structure may claim to be the best qualified or, at least, the best connected to resume a management position. Regardless of the theoretical soundness of collective management of resources, the legacy of recent historical experience will be a barrier to participation.

The NCS (1985) and the NPESD (SRV 1992b) were drafted by the very conservative (to use the political not environmental definition) IUCN, WWF and the UNEP, and are typical of proposed strategies of a bureaucratic, light green, weakly sustainable management type. By definition, the conservative strategies of this type avoid the issues of causation of the ecological crisis. Within these views, for example, the 'problem' of deforestation in Southeast Asia is viewed in terms of a lack of national estate management rather than as a dilemma for national governments, who are forced to sell off that estate to service foreign debt or raise hard currency in the global market. Likewise, the responsibility for environmental degradation is shifted from national governments to the actions of the poor, who are blamed for having to destroy an ecosystem in order to eat. The structural deficiencies, either national or global, are never considered in the SD rhetoric of the international organisations. To do so would be to question the national development direction and the NPESD, based as it is on the rhetoric of the UNEP, IUCN and WWF. The strategy is principally one of mitigation of negative impacts of an 'inevitable' ecologically destructive development and is, therefore, only weakly ecologically sustainable. The resulting barrier to a more sustainable outcome can be couched in terms of both a failure to agree on the overall goals of development and a failure to recognise the limitations in the amount of knowledge necessary to assess the appropriateness of the development type.

The International Conference on Environment and Sustainable Development (3-6 December 1990) was held in Hanoi to present a draft version of the National Environmental Action Plan. Both the preparation of the draft and the conference was a UNDP project with the involvement of the Swedish International Development Authority (SIDA), the UNEP[16] and

[16]The UNEP are the supporting body for UN environment activities in general, but according to the UNEP office in Vietnam it does not mean they are aware of everything UNDP are doing that might impact on the environment

the State Committee for Science (SCS, now incorporated within the Ministry of Science, Technology and the Environment, MOSTE). The project included consultant input from the International Union for the Conservation of Nature (IUCN).

The NPESD, is a very ambitious strategy which proposes policy and legislative mechanisms that are almost exclusively Western in approach and framework. The reason for this may be grounded in the authorship of the document. For while it is perhaps one of the best of its type in the world, it was generated in the most part by the IUCN, the UNDP and the UNEP[17]. It was, in effect, written for Vietnam by foreign technocrats. The NPESD (SRV 1992b) is based on an interpretation of sustainable development (WCED 1987) that fails to identify the fundamental systemic causes of unsustainability and, therefore, does not provide a sound basis for the most environmentally benign policy in Vietnam.

The foreign influence on policy in Vietnam raises the question of why such importation occurs. Speaking more generally, Fahey (1994: 341) warns of the dangers of Vietnam's complacency over the development of infrastructure and services necessary to support the type of growth they expect. Instead, there is a "Cargo Cult" mentality that foreign grants, loans and investment will 'provide'. In this case, the Ministry of Science, Technology and the Environment's states that one of their central roles is 'to find funding for foreign expertise' (Nguyễn Dac Hy, MOSTE, Interview, 23 September 1993).

A similar phenomenon has occurred with the formulation of environmental policy. The local perception of outside influence is positive.

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[17]The UNEP provides environmental funding to the government to organise a number of activities including workshops and seminars on environmental impact assessment techniques. The focal point of the UNEP on the government side was the former State Committee for Science (now MOSTE) representative and first Vice-minister Mr. Sinh who is the director of the Department of Environmental Management and Resources.

> Vietnam's national culture has a tradition of opening its doors to elements of outside civilisation, thus strengthening itself'. And further, 'the problem is to inherit past traditions and use national culture as a driving force to open doors for a selective reception of outside strengths at the service of the country's development and the people's well-being (Đặng Nghiêm Vân 1991: 65).

Those responsible for the development of environment policy in Vietnam are similarly afflicted with a faith in foreign experience, and this faith is a factor in the ready importation of policy. This faith affects their objectivity in assessing the strengths and weaknesses of such policy and its relevance to Vietnam. In his address to the WCED conference in Rio in 1992, Nguyễn Khanh, Vice-Chairman of the Council of Ministers, confirmed the government's position on its attitude to outside assistance, that the world be clear on the 'responsibility of the developed countries to help the developing countries resolve the environmental problem' (Nhân Dân, 23 June 1992: 1, Vietnam Courier, July 1992: 11).

Importing environmental regulatory systems can be problematic because Western policy and regulation has evolved over the last 25 years and within incremental policy formulation frameworks. As such, the 'developed' policy has been modified and finely tuned through the assessment of the impact of regulation and the experience of the respective regulating agencies. For example, much of the success of environmental law in the West depends on the effectiveness of the respective legal systems. Therefore, the various Western systems do not provide a tidy and transferable 'raft' of measures that can be readily and effectively applied in a different legal environment. Despite this, Vietnamese technocrats are very often uncritically 'open' to outside models.

There is a suggestion that increasingly the 'culture and inherent traditions of the Vietnamese people' are being used 'as the basis of the new law' (Hoàng The Lien, Deputy Director of Institute of State and Law, interview 15 December 1992) Such a development may be

indicative of a rejection of policy models from outside or it may be a recognition of the reality of weak policy implementation generally. It is clear that influences outside Vietnam can have a negative effect on policy direction, at least in terms of a radical outcome. At best, the importation of policy and legislative mechanisms will be difficult to implement due to cultural reasons.

A further example of the inappropriateness of importing environmental policy tools is the concept of Environmental Impact Assessments. As a tool for measuring the mitigation necessary to off-set the ecological destruction of development, most countries have adopted a system of environmental impact assessment (EIA). The EIA is normally applied to individual projects in order to quantify the potential environmental impacts. If these are determined to be too great, then the EIA process assists in the design of mitigating mechanisms. Different forms of policy systems will tend to utilise different forms of impact assessment methodologies with very different goals. In pluralist systems, it often serves to politicise technical decision-making by identifying the various political issues through a process of public participation, for instance, the actions of lobby groups. This contributes to a lateral movement of information which can lead to the creation of new political alliances and coalitions. Vietnam's EIA process is far more technically orientated. The process is designed to focus on scientific issues. The danger here is that many issues raised by EIA's are contentious and beyond simplistic 'scientific' arbitration.

The typical EIA process, which Vietnam is currently implementing, falls short of being ideal for a number of reasons. Firstly, it tends to be applied too late in the decision-making process to reject the project outright, so the level of adjustment that can be made to a project tends to reduce rather than eliminate environmental impacts. Secondly, because the process is usually applied after the project is proposed it becomes difficult to realistically consider alternatives. The process is often seen by project managers and investors as yet another

layer of bureaucracy with consequent delays and expense. Finally, the Vietnamese EIA method does not make any allowance for social impacts and this is a serious shortcoming in terms of achieving a 'human-ecological' outcome.

The implementation of an EIA can be expensive, and therefore less than ideal for poorer countries. The current direction within the European Union (EU) is toward a broader strategic planning model, the rationale being that if appropriate environmentally sound plans are in place, then individual projects, which are consistent with the goals of such a plan, will be designed green and not need an individual impact assessment. Likewise, if the project involved local participation, as the anarchic theory requires, there would be no need for a social impact assessment process or an EIA. The weakness is the continuing top-down implementation structure in Vietnam which severely restricts the necessary flexibility a policy system should have to take advantage of more locally oriented solutions.

The NPESD is grounded within mainstream environmental technocracy as this operates in the West. It therefore fails to acknowledge the structural cause of unsustainability and many of the problems of implementation. Likewise, the National water policy in Vietnam is general and uncoordinated in theory and application. There is only passing mention of concepts such as Total Catchment Management (TCM). The national policy on EIA is out-dated and unworkable and, importantly, makes no allowance longer term strategic assessment. Although the legislative requirement is for an EIA on projects that meet certain impact criterion, there are too few trained officials to carry them out. The EIA guidelines that have been adopted tend to focus only on technical feasibility.

The importation of environmental policy ideas has a number of other aspects in addition to those outlined above which may be describes as environmentally weak. Firstly, it perpetuates and legitimises a reformist SD position which fails to address the structural

causes behind most environmental degradation. Secondly, foreign concepts tend, by a 'cargo cult' like acceptance, to displace and belittle indigenous environmental epistemology, attitudes and techniques that have enormous sound environmental potential, but are in danger of being ignored by 'so-called' sustainable development experts.

5.5.2 Incrementalism as a Barrier to SD

The Vietnamese have a saying that everything should be done 'step by step' including the application of socio-economic reforms and other policy measures. The process of policy formulation in Vietnam is, nevertheless, complex. The evidence and data from interviews and documents suggest that while Vietnamese policy formulators aspire to the rational/comprehensive policy formulation model, the reality is more a combination of aspects of the technocratic and the, 'step-by-step', incremental models. Policy formulation does not consistently follow any one model in any country so it is not a relative weakness of Vietnamese policy formulators that no one model appears to operate in Vietnam. There are, however, ramifications for the environment if policy either fails to identify the current and potential impacts, or fails to implement mitigation strategies.

The step-by-step approach which is culturally favoured in Vietnam may well be the greatest barrier to sustainable development according to the radical SD positions which suggest that time in which effective action can be taken is rapidly running out because:

> [I]f the results of past policy are undesirable, it is often preferable to take the risks involved in radical new departures. When past policies have produced the environmental degradation we now seek to remedy, and when public concern over this result has grown dramatically, clearly incrementalism is not appropriate (Doyle and Kellow 1995: 143).

In Vietnam, incremental environmental policy adjustment leads to weak SD policy because little previous environmental policy experience exists. The introduction of *Đổi Mới* policy

did follow a period of unsuccessful readjustment of the centrally planned system, as the economic growth goals were not attained despite incremental adjustments. The NCS (SRV 1985) was introduced without precedent in Vietnam, but as it was based on the results of incrementally formulated strategies from other countries, it was not a radical policy shift in a global sense, nor was it implemented to any significant degree, therefore its weakness could not be experienced and consequently identified. Likewise, the current NPESD (SRV 1992b) is the result of incremental policy developments elsewhere. The fundamental concepts and recommendations of both these strategies were developed in Western liberal democracies where, in general, 'policy does not move in leaps and bounds' (Doyle and Kellow 1995: 143).

The development of effective policy is, according to the incrementalists, a learning process which requires strong and accurate monitoring of previous policy performance. Such monitoring, particularly in the environment, requires sophisticated measurement and feedback mechanisms. Also, 'socio-ecological impacts are difficult to monitor because of the complexity of systems and the potential for unforeseen synergies. It is thus extremely difficult to be sure of the cause of a problem and the effectiveness of reform. With careful, thorough research it is possible to minimise these problems, but not to eliminate them entirely' (Doyle and Kellow 1995: 138).

For such research to occur in Vietnam a number of factors need to be available. First, a high level of inter-agency communication and cooperation is required, which in Vietnam is very limited (see section 6.5.4). Second, sufficient funding is needed to collect and analyse all the necessary data, also limited in Vietnam. Third, access is needed to the necessary equipment with which to collect the basic data, and, finally, the availability of trained staff is necessary.

The District of Thanh Trì People's Committee identified a lack of equipment and a lack of training as two barriers to increased monitoring of the wastewater. Both these factors are barriers to more sustainable or at least environmentally monitored development for Vietnam. The planning department of the district administration have no information on the concentration of heavy metals or other toxic chemicals in the wastewater. Therefore, there are no data on which to base a warning system. The technocrats seem to have a varying degree of understanding about the risks involved. The HEC are responsible for collecting the data on the sources of pollution in Hanoi but do not have the human and technical resources to be very comprehensive. Without this data, the HEC cannot predict the impact of these pollutants on the district of Thanh Trì. According to the household survey the farmers of Thanh Trì are very concerned about the composition of the wastewater and the impact it might have on the health of their families and livestock. This concern was also identified during the collaborative report *Tăng Cướng Công Tác Quản Lý và Kiểm Soát Môi Trướng ở Thơ Đô Hà Nội, Ơy Ban Môi Trướng Thư Đô Hà Nội.* [Increasing the Management and Controlling the Environment of Hanoi.] (Trung 1992) between the District of Thanh Trì and CRES.

The country has very low resources for equipment and training and therefore is severely limited in being able to achieve the level of monitoring and feedback required for effective incremental policy formulation. Incrementalism requires ongoing cooperation and bureaucratic integration in order to make appropriate and effective adjustments.

5.5.3 Technocracy as a Barrier to SD

Policy formulation in Vietnam also has elements of technocratic policy-making which incorporates scientific and technical recommendations that arise from the professional and technically trained sections of the bureaucracy. In theory, the technocratic policy process may include recommendations from outside the bureaucracy but only within a similar form

of discourse. There is evidence of this phenomenon in Vietnam (see the example of The Institute for Ecological Economy in chapter Four). Analysis in the West of technocratic policy formulation has been based on observations that government action is increasingly suffocated by a 'growing complexity of the knowledge which is used in identifying and solving contemporary problems and an ever increasing dependence on experts in policy making' (Beer 1973: 49). This is clear in the NPESD, for while it is a strategy, and an ideal one, it was only based on technocratic input.

One basic dilemma for environmental policy making anywhere is the fundamental incommensurability of scientific rationalism as expressed in the reductionism of the dominant scientific Cartesian paradigm, and the holistic and more subjective approach of the more revolutionary SD positions. The more radical SD positions, such as human ecology, reinforce the value of alternative epistemologies, preferring the *validity* of local experience, for example, and the 'life worlds' of the affected over the *reliability* of the Baconian methodologies.[18] Methodologically, this is one of the key objections to mainstream SD strategies that require the objectification of the subject, or require that social actors and actions to be objectively 'knowable'. Such a notion is contrary to the phenomenological approach. This is the central problem for environmentalists who not only assume that ecology dictates certain ethical positions, but also assume that a right answer is possible, an interaction which is inescapably bound up with subjective beliefs and perceptions (Doyle and Kellow 1995: 139). The weakness of a rational/comprehensive environmental policy model is the assumption that rationality is always possible and appropriate. The assumption made by Vietnamese policy commentators is that a positivistic

[18]This dilemma is something of a stumbling block for my own position within which I believe a paradigm shift that can benefit the ecological positions will occur more quickly if the current scientific paradigm is incorporated rather than rejected. What is required is for scientists to humanise and be more responsible for the wider philosophical and moral ramifications of their craft.

rationality, either bound up in a ideological notion of Marxist/Leninism or a purely Baconian model of science, is achievable, and further, such a model is the basis of the NPESD (SRV 1992b). Conversely the literature contends that the 'notion of "scientific" public policy is a myth -a chimera- and yet the rational model assumes it is achievable' (Formaini 1990: 130). Vietnamese policy formulators also believe that it is achievable.

Given the scientific rhetoric and the hierarchical structures of Vietnamese bureaucracy, it is important to consider the model of technocratic politics and how this might be a barrier to environmental policy making and SD. In theory, according to the model, each government department should have a substantial core of scientifically trained professionals, and these groups should actively formulate policy at a departmental level, rather than just implement it. Despite the 'rationality' of this, there is not necessarily any universal agreement on the technical standards on which policy may be based. For example, the acceptable levels for each chemical that can be released into the environment is, in most cases, quite contentious, and the level acceptable to policy makers will vary from ministry to ministry. The Hanoi Environment Committee (HEC) would have liked to recommend the implementation of standards in use in Germany, however, the levels adopted by the People's Committee for the City of Hanoi were much lower[19]. The HEC were told that was necessary because if standards were too high investors would be deterred, which would then threaten that part of the *Đổi Mới* strategy that encourages outside investment. Likewise, and mindful of the case study of the Hanoi/Thanh Trì wastewater re-use relationship, the HEC believes it is important that Vietnam does not inadvertently complicate the issue of wastewater re-use by introducing unnecessarily stringent effluent standards.

[19] The German pollution regulation system includes both sticks and carrots. The 'sticks' include stiff fines (Jacobs 1993: 18). The HEC assumed that the use of stiff fines would fail because offending SOEs would not be able to pay.

A further weakness of the technocratic bureaucracy in Vietnam is that, like technocracies elsewhere, it assumes 'that reliable knowledge of what causes policy problems is possible' (Doyle and Kellow 1995: 140). In most environmental policy situations this would be a dangerous assumption. Vietnamese implementing agencies, such as the HEC, admit that 'reliable knowledge' is beyond their very limited resources (Chairman Trương, interview 18 September 1992), and further, in a seminar in Hanoi on policy making, delegates concluded that far more commitment to scientific research was required to keep policy formulators abreast of the continuing environmental degradation (Nhân Dân 1991: 4).

Furthermore, technocrats assume that it is possible to specify policy goals in isolation, and then evaluate rationally a number of means of achieving those goals. It is clear in Vietnam, as it is elsewhere, that the policy goals of different government departments and agencies are widely divergent. It is these two parallel problems of appropriate epistemology and the difficulty of agreement on appropriate goals that limit the potential for a radical SD strategy. It is the question of setting overall policy goals that is largely determined by the predominant ideology of the government.

In Vietnam, the technocratic policy formulation function of the bureaucracy is institutionalised in the research institutes that are attached to each of the ministry's. These are effectively 'captured' by their respective ministries agendas and are, therefore, not necessarily objective. As the technocracy is staffed by 'experts' of particular disciplines, and there is little tradition of cooperation, research has not been interdisciplinary. The result in any technocracy can be that

> a number of environmental quality decisions are made by people who feel a strong professional identification. Their view of themselves as conservationists, economists, sanitary engineers, foresters, etc., may be expected to shape their perception of the environment and their competence to handle it. In these roles their perceptions and roles become the implicit and

> usually unchallenged determinants of plans presented for public choice (White 1966: 124-125).

In the case of the development of the NPESD, Vietnam drew heavily on the global technocracy of the UNDP, UNEP, SIDA and the IUCN, as well as its own 'experts'.

5.5.4 Information Flow and Inter-agency Communication

One of the central problems for the successful implementation of both the Environment Law and the NPESD within the context of a reformist model is the collection and analysis of data upon which monitoring and specific regulation is based. Such a process is severely limited by poor communication between government departments which is well known, and is, therefore a barrier to improved sustainable development. This section explores a number of aspects of inter-agency cooperation and how these impact on policy formulation and implementation. This section explores those parts of the Vietnamese SD strategy that relate to the case of the re-use of wastewater.

Although comprehensive SD policy is the goal in Vietnam, for it to succeed, on a realistic level, it requires significant investment in resources. This is an important restriction, particularly in Vietnam, where money and equipment for extensive studies is severely limited. This phenomenon is universal although obviously more pronounced in poorer countries. In addition, the limited information that is available has been biased by those who collect it and then present it to the actual decision makers. In highly bureaucratic systems, such as Vietnam, the information can become out of date while still in the process of reaching the final decision-making level. The problem of time is particularly significant for some environmental issues where damage may continue while policy and regulation is formulated and enacted, and then the degradation has accelerated to a degree beyond the remedial effect of the legislation. It takes time to gather data, process and analyse the results and most importantly, to 'communicate it to those who need it' (Doyle and Kellow

1995: 139). The more time spent investigating a phenomena or issue, the greater the risk of being too late to correct it. The speed and nature of communication between various research institutes and government departments in Vietnam is very slow or non existent. There is, nevertheless, growing scientific evidence that policy makers should apply a precautionary principle[20] when regulating environmental quality standards, because of the potential for synergistic relationships to develop and because of the potential for ecological systemic collapse to occur without warning when certain absorptive capacities are exceeded.[21]

The question of bias in the information provided to decision makers is also relevant in Vietnam. The nature of information gathering and research in Vietnam is very hierarchical and 'in house', with each government department researching within its own research institute. That information from the research institutes will be biased is obvious and not unexpected, but given that this is the only advice available to decision makers it severely limits the potential for consideration of multi-disciplinary alternatives.

Essentially, part of the problem of a lack of information or knowledge flow is the very low level of inter-agency communication in Vietnam. Inter-agency communication is crucially important to the formulation and implementation of environmentally sound strategies. The interdisciplinary nature of sustainable strategies requires the integration of data from a range of sources and the involvement of a diverse range of expertise and agreement on

[20]Such a notion is a key component of most mainstream and radical SD strategies, but has proven difficult to apply to actual policy because it is difficult to regulate and is considered by commercial interests as anti-developmental.

[21]As is the case of the acidification of European forest soils. While monitoring of acid rain-fall in Europe had continued for some years it was assumed that the trees were coping with the acidification, it now transpires that the absorptive capacity of the soil had not been reached and therefore the soil had protected the acid sensitive trees from exposure, but when the level of acidification in the soil passed a point, not anticipated by science, the trees began to die and became seriously damaged within 2-3 years (Dietz van der Straaten 1992: 53).

policy goals., for example, the People's Committee of Thanh Trì wants to promote the use of the wastewater but the Hanoi People's Committee wants to control what it considers to be its own pollution and contain it within the city. Professor Mai Đình Yên considers this response typical of the city engineers' obsession with treating the sewage within the city limits. '[T]he idea of the engineer is to contain the pollution not utilise the wastewater' (Mai, Interview, 10 January 1993).

The policy making structure of Vietnam operates on a number of levels. Officially the structure is regimented with hierarchical lines of distinct communication, but in reality a range of connections, influences and networks operate. Old allegiances and loyalties come into play, old Confucian principles of respecting elders and teachers remains relevant. Bureaucrats in Vietnam now have three principal methods of information gathering. The official method of obtaining information is by written application to the appropriate ministry or institute, and the unofficial, informal method of obtaining information is through a network of familial, village loyalty or other connections by association. The third method is a commercialised combination of these.

When information is required from another department, the official method is described as laboriously slow but is used because it ultimately provides some documentation (Định Xuân Hùng, MOSTE, Interview, 1 December 1992). The request travels vertically within the respective departments for approval to seek and request the required information, the request is made and a similar vertical process occurs in the other department. This is typical of bureaucratic systems and not unique to Vietnam. In Vietnam, however, there is great mistrust of the 'other' department, and this is one of the barriers to greater inter-agency communication, because some officials who have data on the environmental impact of industrialisation, for example, have been reticent to release it to other departments for political security reasons. They believed that information about Vietnam's environmental

degradation weakened the image of Vietnam in the 'eyes of our enemies' (Nguyễn Trong Chuan, Director of the Institute for Philosophy, Interview, 9 November 1992).

The second method, which has probably always been the preferred one, is the use of a network of contacts based on informal and familial connections, for example; former school comrades, or common rural origins. This method is very quick, because contact is made directly and horizontally between departments. The weakness of this method is that it is 'unofficial' and if the information required is for the preparation of an 'official' report then the information needs to arrive 'officially'. To overcome this a combination of the two methods has developed. An information seeker would use the 'unofficial' network to find out exactly what information was available and where it was located, and then use the official method to procure it. This way a request for the exact document or report is made and this accelerates the process.

Since the introduction of *Đổi Mới* a third method of information flow has developed. It has resulted in part from the progressive commercialisation of information and the recognition that there is a 'market' for information because it has monetary value. This affects both local and foreign researchers. The keepers of information have progressively applied a schedule of fees to the release of data, documents and research work. The fees may vary depending on whether the information is sort by a local or a foreigner. The local information consumers are using their informal networks to isolate the source and exact location and then buy it direct. It is possible in this way to also reduce the price as well as to speed up the process. Many bureaucrats seem confused about the 'rules' that may apply.

None of these methods allows for the unrestricted flow of information and data which are critical to optimum policy making. Without all the available information, a rational assessment of the potential impact of different strategic and policy choices cannot be made.

In this sense, the barriers to free information exchange among technocrats, formulators and implementors of policy limit the potential for greater degrees of sustainability. Successful policy needs as broad a perspective as possible, because most socio-environmental issues are of an interdisciplinary nature.

A number of agencies contribute both data and expertise to the process of environmental monitoring and assessment. In Hanoi, the main contributions are from the Ministry of Health, responsible for the formulation and implementation of public health policy, and the HEC, who are responsible for the enforcement of the provincial environmental regulations. The Ministry of Water Resources and the Ministry of Construction are both involved with the administration of surface and ground waters, although the Ministry of Water Resources is more concerned with irrigation and flood control issues than urban pollution. The Ministry of Construction is the main institution for designing and implementing urban supply and drainage systems .

Indeed, there are a number of agencies that have some policy formulating input, strategic responsibility in terms of planning, and a regulatory capacity over activities which affect aspects of the watershed. Although these various agencies have, in the past, contributed to seminars on SD and the development of the NPESD, there is little that connects them on a day to day implementation level. In contrast to the ideal model of Total Catchment Management, there is little of the horizontal integration theoretically required to ensure that sufficient data is available to decision makers (Collett 1992: 6). In this case, for example, the Hanoi Sewage and Drainage Company, who are responsible for all drainage, are having problems designing future drainage capacity requirements because the water supply company would not, or could not, give them the projected water supply figures, which are fundamentally important as all water entering Hanoi must be allowed for in planning

drainage (Đỗ Ngọc Hoàng, Hanoi Sewage and Drainage Company, Interview, 24 November 1992).

A lack of inter-agency coordination is also one of the central barriers to a better wastewater treatment solution and this is recognised by the technocrats currently responsible for the drainage system (Lê Minh Châu 1990: 3, URENCO 1992). The principal barrier during the formulation of the current development Master Plan for Hanoi, for example, was this universal and well recognised problem of poor inter-organisational communication. The very nature of a Master Plan is interdisciplinary and yet in a typically bureaucratic way Hanoi's various authorities have not coordinated such fundamental issues as common preliminary goals. The Sewage and Drainage company had not been told of the road network design nor had they been asked for the plans of the drainage system, existing or proposed. The city level authorities create and implement the planning and zoning policy which will affect the political economy of Hanoi and, subsequently, Thanh Trì. The nature of information flow in Vietnam does not, therefore, assist in the development of broadly-based integrated solutions, nor in the necessary inter-agency cooperation required by the reformist model of sustainable solutions.

5.6 Opportunities for SD: Informal Policy Formulation

There is a degree of evidence in Vietnam of an informal method of environmental policy formulation which has had some significant success in terms of SD ecological outcomes. By definition, such methods or outcomes are problematic to analyse because they are not recorded in a formal way, nevertheless, the informal processes by which these examples occurred can contribute to a model of anarchic negotiated environmental outcomes which are consistent with a social-ecological view. Below three examples of informal policy formulation are described. The first is an example of the impact of Confucianism and

suggests the influence of the Vietnamese technical elite. The second and third examples briefly highlight the potential for informal horizontal environmental policy solutions.

5.6.1 National Parks

In 1970, Võ Qúy and a number other scientists were increasingly concerned about the effects of the US chemical spraying in the south of Vietnam. Võ Qúy received ministerial approval to lead an expedition to the south of Vietnam in 1971. Their first attempt was abandoned due to the continuing heavy bombing. In 1974, Võ Qúy organised another group and followed the Hồ Chí Minh trial south to catalogue the effects of the herbicides, the bulldozers and the bombing. The expedition lasted for three months. Võ Qúy commented that seeing the total ecological destruction inspired him to work on the conservation of nature in Vietnam. The experience led him to the conclusion that ecological recovery would be critically important for the eventual recovery of the whole country. (Võ Qúy, Interview, 3 November 1992)

In 1975, Prime Minister Qua pH Dong asked Võ Qúy and other scientists to continue to work on this issue. A committee was formed to investigate the environmental damage in the south of Vietnam. The committee visited all the districts and areas most affected by the war. The purpose of the committee was to assist in the reorganisation, use and protection of the remaining natural systems and endangered species. During this period Võ Qúy discovered a previously unrecorded (scientifically) species of Couprey, a small forest deer. The local people explained to Võ Qúy that they only knew of twenty or so near the border of Laos and Cambodia. In order to protect the Couprey, elephant, pheasant, tiger and other rare animals in the area, the committee recommended that a National Park be established.

The authority of teachers is unquestioned and the loyalty of students is lifelong. It is this Confucian phenomenon that secured the establishment of one of Vietnam's National Parks.

Professor Võ Qúy Director of the University of Hanoi's Centre for Resource and Environmental Studies (CRES), 'discovered' a new species of mammal in a southern central province of Vietnam. The area was not densely populated and remained in a relatively natural state. The population of the new species was not known, but given that it had not been scientifically recorded before it was assumed to be in small numbers, and therefore its survival tenuous. The University of Hanoi and a number of international conservation organisations recommended to the government that the area be declared a national park. The minister responsible at the time was an ex-student of Professor Võ Qúy. The National Park was proclaimed[22].

There may be no link, it may be a coincidence, or the interest of international organisations may have provided the impetus. The government may have simply agreed with the argument for conservation. Võ Qúy described the link as the minister's loyalty to his former teacher as the only reason necessary for the National Park to be established. There is presumably a very strong sense of responsibility on all respective 'former' teachers not to abuse this power. Professor Võ Qúy described the process in terms of the minister recognising the scientific value of his (Võ Qúy's) argument and that he had applied 'discretionary influence'. In this case, the outcome was environmentally sound.

5.6.2 Urban Pollution and the Women's Union

In another case in Hanoi representatives from the Women's Union approached the management of a Chemical company operating in one of the living quarters[23] after citizens had complained about the incessant pollution. The Women's Union were concerned about

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[22]This type of elite influence is largely overlooked by foreign analysts, although it is acknowledged it is frustratingly nebulous and difficult to be 'academic' about.

[23]A 'living quarter' is the translation for a residential development similar to the European concept of a public housing estate and includes medium to high density housing.

the occupational health and safety of women workers, but, in this case, they were advocating on behalf of local residents. The Union claims to be active in the promotion of healthy urban environments on behalf of citizens in general, particularly for the sake of children. The Union has made recommendations[24] to the managers of factories located near kindergartens to reduce the level of pollution (Dương Thị Vịnt, Vice-Chair of the Provincial Branch of Women's Union, Interview 4 December 1992). These 'recommendations' were also made to the People's Committee of Hanoi. The Vietnamese Union of Women cannot be described as a civil initiative, as it is fully sanctioned by the government and forms part of the quasi-state, Fatherland Front umbrella of national organisations. Indeed, in the opinion of the Institute of Women's Studies, the Women's Union acts like a de facto Ministry of Women's' Affairs, a 'political movement not a social movement' (Trần Thi Vân Anh, Institute of Women's Studies, Interview 5 December 1992). The significant point in this case is that the Women's Union made the recommendations for an environmental action.

5.6.3 The Thanh Trì Textile Factory Case

Despite complaints about the pollution of the water flowing from Hanoi into Thanh Trì through the drainage canals and rivers, the local village authorities describe that they were so frustrated that they approached factory management committees directly[25]. For example, one major textile factory discharges untreated effluent into the canals upstream of the pumps which provide the water for the aquaculture ponds. The cooperative downstream from this factory approached the management committee of the textile mill about the impact of their effluent on the aquaculture. The mill was unable to treat their own waste, but

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[24]The 'recommendations' were used to describe the action taken, the director did not add whether or not they were followed.

[25]The People's Committee of Thanh Trì has expressed a sense of powerlessness to prevent or reduce the incoming pollution.

agreed to stockpile it and release it only at certain times[26]. Consequently, with releases known to occur on Tuesday afternoons, the farmers could turn off their pumps at those times to avoid contamination[27].

While this is obviously not an ideal solution environmentally, the arrangement is an example of horizontal cooperation between enterprises, which is a principle of a decentralised sustainable political economy. It must be said that, in the above case, the technology allows a controlled release of effluent. An example where such an arrangement would be technically very difficult is the case of air pollution from the various factories throughout Vietnam, particularly in heavily industrialised Vĩnh Phú, there could be no such flexibility. The air pollution in Vĩnh Phú has caused reduced banana production in plantations downwind of the factories. The plantations have been administered by separate cooperatives and highlight the problems of insufficient inter-agency communication which, by default, supports the argument for more comprehensive, decentralised planning. The battery factory in Vĩnh Phú has been made aware of its impact on the plantation, and presumably the health of the local human population, but could not afford the pollution mitigating measures. No changes were made to the offending production process and the banana-growing cooperative had not been compensated for the losses. The impact on the health of the residents downwind had not been explored.

The two last examples demonstrate two of the policy realities in contemporary Vietnam. Firstly, a number of issues, such as pollution are not being addressed by the government.

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[26]The planning department of the District of Thanh Trì related that when approached with the problem of the obviously polluted water, the textile mill management wanted to know how they could treat their waste cost effectively.

[27]The Thanh Trì district administrators believed that the farmers would be prepared to pay 1-3% of their income directly towards upstream polluters for on site treatment.

Secondly, local communities are responding, horizontally, by-passing the involvement of higher authorities. This later response may be in part due to a recognition of the inaction of government but also is consistent with the anti-authoritarian cultural trait of the Vietnamese. It is this latter approach which is both consistent with a social-ecological approach and has enormous potential in Vietnam because it is culturally acceptable.

5.7 A Proposed Solution to Urban Pollution, Wastewater Re-use and Treatment in Hanoi.

Although parts of the NPESD support the various notions of ecologically sustainable agricultural production and indigenous agroforestry concepts, such as VAC, there has been no official policy to integrate such ideas with the wastewater/aquaculture developments in Thanh Trì. Despite this the potential for such an integrated and sustainable approach has not gone undocumented. Professor Mai Đình Yên and others from the University of Hanoi have applied the experience and data gained from the development of the aquaculture industry and the techniques and principles of VAC to design an ecologically sound agroforestry scheme on a larger scale.

The VAC model in Vietnam is an adaptation of many traditional intensive horticultural, aquacultural and livestock rearing techniques to maximise the synergistic relationships that can be created and nurtured. As with other agroforestry models, such as permaculture, VAC represents the pinnacle of agricultural sustainability and the ultimate environmentally friendly development direction for food security. Local experience shows that a family controlled VAC area is 5-8 times more productive than that of rice cultivation alone. The rice productivity in a VAC system can be up to 10 tonnes/ha/year (Tú Giay n.d.). Also families using VAC tend to have improved nutritional status because of the variety of species. Diversity of species is one of the features of the system. Economically the advantages of the system are clear, as not only does the methodology lead to improved

productivity in particular species, but also supports the development of a variety of species and commercial products such as bamboo, timber, rattan, leather and hide from animals (Tú Giay n.d.).

The principal environmental benefits of the concept of VAC is the energy and material recycling that occurs as part of the system. All human and animal waste becomes an input into the system as fertiliser and is consequently treated on site. The efficiency of the system is based on the almost perfect conversion of solar energy into biomass. Secondary environmental benefits are that enhanced productivity does not depend on the application of artificial fertilisers and pesticides, therefore, these chemicals do not become an environmental burden on either the area around the consuming farm or the producing factory. The application of the principles of VAC reduce the dependence and the environmental consequences of agro-chemical use. It is conceivable that if all farming followed such principles chemical use could be zero.

A further, and perhaps more esoteric benefit of VAC and other agroforestry systems, is the spiritual benefit of living and working with such a pleasant environment as 'a way [to] do exercises and positively relax' (Tú Giay n.d.). The VAC system, when applied in full, includes a pond for aquaculture purposes. The pond is very important to the system because it acts as a water storage, a waste treatment system and a source of protein from the fish and a potential source of animal feed such as duck weed. The pond must be above a certain size in order to allow all the relevant natural processes to occur. The University of Hanoi (CRES) have worked on adapting the system for upland conditions (Lê and Rambo 1993) and Professor Mai Đình Yên, Head of the Faculty of Biology, has developed an extended model of VAC to enable the same principles to be applied to the Hanoi/Thanh Tri wastewater relationship (see below). The Hanoi Branch of the National Women's Union actively promote the concept of VAC, particularly tree planting as a component of

agroforestry. Generally two or three women in each commune will be responsible for the tree program. The Farmers Federation have programs for information dissemination, the Biology Department of the Pedagogic University No. 1, in Hanoi, have worked on 'scientific' aspects of the model. Hanoi has a VACVINA Association to represent the interests of those utilising the model and to this end they have been active in lobbying for ODA (Foley et al 1989: 51).

While the VAC system has developed around a household size economy, the principles are applicable on a larger scale. The ecologically sound principles explicit in VAC could be extended into a model for a larger system such as that proposed by Professor Mai Đình Yên, Head of the Biology Department at the University of Hanoi. The proposal is based on scaling up the requirement of a family scale VAC system of a household pond to the size of ponds which already exist in both Hanoi and Thanh Trì.

Professor Mai proposes a design that maximises the nutrient value reaching Thanh Trì and utilises the lakes within Hanoi as stabilisation ponds for the waste water, with the lake at Lenin Park as a silt dam. Professor Mai has calculated the sewage output from one million people, as 77 grams BOD per person; a one hectare pond at 25°C could decompose 642kg BOD/day if enough oxygen is available. Therefore, a projected future population for urban Hanoi of three million people would require 500 hectares of ponds. In Hanoi presently, there are more than 500 hectares of ponds suitable for stabilisation purposes.

For such a system to be possible most of Hanoi's current pond capacity must be retained. Therefore, the current practice of illegal land reclamation must be curtailed. This seems unlikely given the difficulty authorities have had controlling illegal house building. Many new houses are built on land that has filled and levelled around ponds and lakes within the urban area of the city. This reclamation has reduced the flood mitigating capacity of Hanoi,

although the lake levels are usually quite high and, therefore, there is little reserve capacity anyway. The lakes serve a number of functions. They affect the micro-climate by moderating the surrounding temperature and they have a significant recreational role as open space, as many are incorporated into parkland.

The key potential barriers to the implementation of the latest Hanoi Master Plan is a lack of money and the legal clarification of the status of land. These issues would also be a barrier to the construction of the Mai Model which incorporates artificial wet lands and a green belt with lagoon wastewater treatment and aquaculture. The application of the Mai Model will require a significant investment of money and land. The use of 'low technology' solutions, such as lagoon based wastewater treatment, can be expensive in terms of the amount of land they require. This must be factored into the Cost/Benefit calculation of any scheme. The peri-urban/rural zone, while often being one of the most productive agriculturally, is often under intense development pressure as urban sprawl extends into the cheaper surrounding hinterland. Increasing demand will, in an open market, lead to higher land prices and therefore greater incentive to relinquish control of this land. Therefore, the land available for lagoon-based treatment will be diminished. Economic factors must include the opportunity cost involved in not selling to developers the area that must be occupied by ponds and lagoons. Although the pond system is land intensive, it can generate income from the application of nutrient recycling systems. Valuing all the benefits of a solution such as the Mai/VAC model can be problematic for the same reason that environmental economists grapple with the notion of framing environmental issues in mainstream economic terms.

The Mai model acknowledges that while wastewater treatment of the largely biodegradable industrial waste from the food processing factories can be dealt with, the waste products from other sites such as leather tanning, paper and rubber processing are far more serious.

The heavy metal pollution that has been released from these factories remains a problem. At the very least every factory should have its own treatment ponds[28]. According to the HEC some older industrial plants have rudimentary treatment facilities but these are often in disrepair or are operated by inadequately trained staff. In some cases the factory management are avoiding the additional costs of running the treatment process by not using it.

The most radical and sustainable policy option would be to apply the principles of permaculture across the city. The benefits would be a higher net fish production because, even if there were slight losses of productivity due to reduced nutrients, there would be greatly reduced health risks. There would also be fewer mass fish kills from toxic spills or eutrophication. The benefits to Thanh Trì would include a greater potential value of fish products due to reduced chemical and metal contamination. Greater quantities of timber could also be produced using techniques from permaculture/agroforestry. Increasing the supply of food and fuel (from wood) near the city would reduce transport costs and pollution and, the absorption of carbon would reduce the net CO^2 contribution to Greenhouse gas emissions.

The benefits to Hanoi would be improved flood control, safer fish products, improved micro-climate, more oxygen produced near and within the city, recreational opportunities and a reduced cost to food consumers because of reduced transport costs. There would also be improved property values due to improved amenities. The establishment of local sewage schemes in a VAC style system would have obvious local benefits rather than the extraction of taxes to pay for some distant treatment works, therefore, an integrated VAC type sewage

[28]Where space restrictions limit the area of surface ponds other possibilities are available. For example, the use of a system of vertical wetlands may be more appropriate.

treatment model would be an opportunity for local organisation and control which is consistent with anarchic types of SD.

A further benefit to the region would be a halt in the decline of genetic diversity in the Red River Delta identified by Fforde (1993b). The Mai model proposes that shelter belts or green buffer zones should be grown around the artificial wetland/lagoon treatment ponds, as would be the case in a small scale application of VAC. These areas could be used as genetic banks for species indigenous to the delta area. The commercial potential of such projects is very difficult to determine, although the area would have some other benefits.

A number of barriers exist to the implementation of the Mai model. For example, a combination of the Mai model and VAC techniques will be hampered by a lack of capital available to farmers at a household level. A certain amount of capital is required to establish the system. Capital is needed for tree seedlings and livestock, including at least one pig and a number of fowl. In a normal VAC model, the construction of the pond may require more labour than the family can provide, which could be overcome by a cooperative arrangement with other families. In a Mai/VAC model, most of the ponds are already established, although the additional capacity for flood mitigation may need to be built. Where the system can be applied within the urban areas of Hanoi, such as in cooperative pond/house gardens within residential blocks, these might incorporate the formerly installed, but now unservicable wastewater treatment pond.

Another barrier is that the first few years after establishing a VAC model farm are economically less profitable. Many of the income producing crops, such as timber and fruit, take many years before harvesting is possible. The irony of the transitional period is that farmers now have an economic incentive to develop their farms but no longer have access to subsidised capital and resources. The National Centre for Social Sciences has

recognised these problems and recommended that the government make loans available to the farmers through already existing national institutions such as the National Farmers Association. The recommendations included that the State provide technical instruction in VAC methods and the use of technology, particularly for improving the technology of aquaculture (Phạm Xuân Nam, Vice President NCSS, Interview, 3 October 1992).

A further barrier is the amount of time necessary for farmers to learn about the techniques and fine tune them for their specific circumstances. This barrier to improved prospects for SD affects women, particularly those who are central to farm work and are primary child carers and home managers. Women are usually responsible for the house garden and tend to be solely responsible for all the water related activities to do with the house, for example, collecting the water for washing, cooking and cleaning, washing the clothes, children and watering the animals. The increasing burden on rural women to provide child care, house duties and farm labour mean that they are not in a position to innovate or have the time to experiment with potentially more sustainable farming techniques or species. Such innovation requires a greater investment in time. This is a significant barrier to greater SD. To address the issue of increasing work load on women, the Women's Union are actively encouraging greater community cooperation. The Women's Union are promoting this through their education program called the 'New Cultural Family and Civilised State (Style) of Life', which includes 'uniting with your neighbourhood to provide mutual assistance' (Dương Thị Vịn, Vice-Chair of the Women's Union, Interview, 5 January 1993).

According to the household survey, the average number of hours worked by women in the three villages was 11.3 hours/day. The definition of 'work' in the survey included all household duties in support of the family and income generating work either within or outside the home. The women of Trấn Phú worked an average of 12.4 hrs/day and the

women of Yên Sở and Thịnh Liệt both recorded a mean of 10.7 hrs/day. It was not possible from the survey data to determine the reason for the variation or compare this to a national average as this data was not recorded in the 1993 World Bank Living Standards Survey. A number of women had jobs in Hanoi which were their main income generating work but reported an additional 3-5 hours a day in household duties. A number of women in all three villages were involved in some form of marketing of produce either locally or in Hanoi. The hours spent in this activity are included in the figures above.

The evidence suggests that since the introduction of *Đổi Mới* women have had to work harder than before. Research by the National Women's Union, The Women's Institute under the NCSS, and the household survey confirm that women are using any available time to invest in income-generating activities. While it may be argued that ultimately the pursuit of a VAC system is income generating and reduces cost, the lead time may be longer than other activities.

Individual farmers demonstrated an interest in any option that might lead to greater productivity. Fourteen of the 44 farmers who responded to the household survey said they wanted information on new techniques that would boost production. The opportunities that have emerged during the transitional period are that *Đổi Mới* reforms are acknowledged as having increased the incentives to work the resources harder and/or more efficiently, and to invest more time/money/risk (financial and health) in improving productivity. Therefore, concepts such as permaculture expressed in Vietnam as VAC are suited to the economically decentralised environment in Vietnam. The implementation of such a model would depend on comprehensive extension work as currently 45 of the 54 farmers who responded reported that they have gained the bulk of their knowledge of aquaculture from personal experience. Twenty-three of the total sample of 54 households received advice from village leaders or coop management directly. Many farmers said that they depended on other

farmers for information. None of the farmers reported receiving information from any of the universities that had done some research on issues that are relevant to the district. This is an example of the low level of horizontal integration.

The potential for a broader more integrated system such as a Mai/VAC model is more complicated in terms of economic organisation and the continuing existence of certain markets, ideally within Hanoi, for fish, vegetables and timber. New markets for labour in Hanoi are changing the employment patterns and demographics of the northern section of Thanh Trì, transforming it into a dormitory suburb which has increased the value of land. Such a trend will affect the cost/benefit analysis of any future wastewater treatment system and have the greatest impact on those concepts that require the most area, such as the Mai/VAC model.

5.8 Conclusion

The key environmental strategy document, the NPESD, has been described as sound within a reformist model, but flawed in terms of more radical theory. It does allude to some sustainable outcomes but fails to address the systemic causes of the pollution, nor does it provide a sound plan for sustainable implementation. The strategy does not have an integrated outlook, and consequently falls short of making proposals for integrated solutions. The greatest potential for the best environmentally sound outcomes are when, as Bookchin and others have described, all systems, social and ecological, achieve a high degree of integration.

Some aspects of the policy formulation process in Vietnam have been explored in terms of barriers to sound environmental outcomes. Vietnamese policy makers perceive the process of policy formulation as rational/comprehensive, however the reality of limited formal cooperation and the use of informal networks of information exchange means that the

policy making process is not rational nor comprehensive. The increasing commodification of information may create new information providers, such as the research institutes and university centres, if a sufficient market for information is generated. This is inconsistent with a social justice perspective because only those who can afford to pay for information about the environment, or the impact of processes on it, will be able to participate fully in the formulation and implementation process.

It is clear that in Vietnam, the bureaucracy aspires to a rational-comprehensive model, although environmental policy formulation is generally both technocratic and incremental. The policy formulation type in Vietnam presents a number of barriers to any sustainable outcome, including hierarchical structures, inadequate data about current conditions, shortage of adequately trained personnel, and an inherent inertia which slows responses to new environmental conditions or theories. The technocratic nature and lack of transparency of the bureaucracy alienates lay people from the process of policy formulation.

However, there are some sustainable developments that can be recognised and could provide an excellent opportunity for a better environmental outcome in Vietnam. The state has changed its policy direction in the past in response to a failure to implement policy at a grassroots level. It is probable that the SD principles of the NPESD will be compromised when implementation proves problematic. By contrast, local interpretation of policy has led to new policy and local initiatives which are consistent with models of anarchic ecological development.

Environmental policy strategy in Vietnam contains a number of features that do not support a strongly sustainable position and will contribute to the failure of the policy to achieve a more sustainable development direction. The inherent positivism of the scientific approach to policy formulation in Vietnam is a barrier to a such an outcome. The integral 'faith' in

science and technology leads to technological determinism which, when not tempered by a precautionary principle, is the cause of many environmentally degrading processes. A myopic 'scientific' view does not consider the bigger picture and typically makes no allowance for the social impacts of technological change.

From an centralised bureaucratic perspective the creation of the MOSTE reduces the potential for an integrated national approach to solutions, by marginalising and separating the environment into the third level of a junior ministry. The NPESD has a number of features that tend toward a sound environmental outcome but, on the whole, it represents a mainstream and reformist approach to resolving SD issues. Like similar documents in other countries, the NPESD does not challenge national development policy and compromises on solutions to enviornmental solutions. As a document largely based on overseas experience, it will fail to meet its own goals because even its reformist program is not totally implementable in a Vietnamese context. The sectors that relate to this case study have not acknowledged the potential opportunity that exists for a 'alternative' development.

Vietnamese environmental policy has drawn heavily on Western models. This has weakened the potential implementability in terms of the culturally inappropriate enforcement models. It has also, to some extent, confirmed that Vietnamese policy makers overlook potentially sustainable local technologies and effective non-state political arrangements of informal policy implementation which are successful and should be encouraged, in preference to state prescribed top-down policy enforcement.

Chapter Six

A Case Study of the Utilisation of Wastewater in Thanh Trì

6.1 Introduction

In this chapter the case study of wastewater re-use in the District of Thanh Trì is presented. Thanh Trì lies downstream and to the immediate south of urban Hanoi (see figure 2 over). This case study illustrates some of the barriers to, and opportunities for SD in Vietnam. The first sections describe the physical features, water quality and the history of the wastewater re-use system. Central to the identification of opportunities for a more sustainable development in Vietnam is the question of whether the wastewater is a form of pollution or an economically exploitable resource. Therefore, the impact of the wastewater on the health of residents and workers in Thanh Trì is examined and the results of some of the aspects of the household survey conducted as part of this research are presented. In this chapter a description is given of the process by which the nutrient rich wastewater is used for agricultural and aquacultural purposes. The relationship between the *Đổi Mới* reforms and the relevant aspects of wastewater re-use are considered.

6.2 Physical Description of the Case Study Area

6.2.1 Hanoi's Rivers and Lakes

The wastewater that is available for re-use in Thanh Trì comes predominantly from Hanoi. The following section describes various aspects of this catchment. Hanoi's urban surface water system is a complex series of drains, streams, rivers and lakes which channel all the wastewater from Hanoi and they can be described as heavily polluted. As the wastewater flows through this system, a certain amount of natural self-purification occurs, although there are thousands of points at which pollution enters. Increases in urban population and development lead to an increase in the volume of run-off and sewage which, in turn, puts more pressure on the self-purification process.

Figure 2. Map of Hanoi, the northern area of Thanh Trì is in the lower right (Trần Việt Anh).

[Note maps 31, 32, 33, 34, 35 of Thanh Trì are reproduced in Appendix D.]

Hanoi lies on the main branch of the Red River close to the head of the deltaic structure. The Nhuệ is a branch of the Red River diverging some kilometres upstream from Hanoi and eventually collecting all the water that drains from the city, before it re-enters the Red River further south (Trần et al., 1990: 2). Of the four rivers that drain Hanoi, the Nhuệ is the largest, with a dry season flow rate of 2.6 m/s. The river's catchment is 107,000 ha of which about 5,000 ha is within urban Hanoi (Trần and Dương 1990: 2).[1] The Tô Lịch River rises near West Lake (Hồ Tây), flows south through Bắc Tinh, past rubber, soap and cigarette factories in Rạng Đông, Dac Kim, and Thanh Liệt before joining the Nhuệ River in the district of Thanh Trì. The source of the Nam Dồng River is Giảng Vô Lake, which flows generally south through Bà Định, Đống Đa, Trung Tu and Định Công village before it joins the Tô Lịch River. The Sét River rises from the Bẩy Mẫu Lake in Lenin Park, flows generally south through Hai Bà to Thịnh Liệt and Yên Sở in Thanh Trì , before it rejoins the Nhuệ River. The Kim Ngưu river is the extension of the Lò Đúc sewer which drains the south-east quarter of the older city (see Appendix D Maps of Thanh Trì).

The lakes of Hanoi have varying degrees of cultural significance, being the sites of various myths and legends. Hoàn Kiếm Lake, for example, in the centre of Hanoi, has great cultural significance, so much so that when in the late eighties, the Hanoi Drainage Company proposed to drain the lake, so it could be properly dredged, a broad public protest erupted in defence of the sacred turtle that resides at the bottom of the lake. To avoid disturbing the sacred turtle, the drainage company drained only half of the lake at a time, bisecting the lake with a temporary coffer dam allowing the turtle continued anonymity.

[1]During the dry season the flow rate in the open canals can be as little as 0.05-0.1 m/s.

Plate 1: Hoàn Kiếm Lake in the centre of Hanoi.

Before settlement[2], the lakes and ponds of Hanoi covered an area of approximately 640 ha but filling during the colonial period has left less than 576 ha, and this has probably been reduced further in the last few years, as some lakes have continued to be reclaimed illegally for building which reduces the overall capacity of the system. Except for Hồ Tây[3], all the other lakes in Hanoi are connected via the drainage network and are therefore part of the wastewater system. The total capacity of the system (excluding Hồ Tây) is 1.5 million m^3. The drainage system provides both sewage and storm water drainage and is too small in capacity to cope with periods of heavy rain which are quite common in the wet season. During these events the system is inundated and flooding results. The flow rate during a typical rain event is 50-100 times greater than that of the normal drainage rate[4]. For this

[2]The archaeological record of human occupation indicates traces of a continuous human presence from the Neolithic period onwards. Stone tools, for example, have been recovered from excavations at Bẩy Mẫu Lake in Hanoi. Later bronze-age implements have provided a rich archaeological record of a people with highly developed technology. The pre-historic record indicates a sedentary human occupation based in villages above the Tô Lịch, Nhuệe and Hoàng Rivers. Administratively this was the period of the legendary Hùng Kings.

[3]Hồ Tây or West Lake lies to the north of Hanoi and partially acts as a recharge zone for the water supply aquifer under Hanoi.

[4]The issue of urban run-off is important in terms of a VSS SD as it can provide an additional water resource for applications such as irrigation. Uncontrolled run-off is also a vector in the process of soil erosion,

reason, the People's Committee of Hanoi would like to improve the speed of drainage (Trương Tùng, Vice-Chairperson of the People's Committee of Hanoi, Interview, 4 November 1992).

6.2.2 Water Quality in Hanoi and Thanh Trì

The utilisation of this wastewater has been very successful in terms of increased production but is not without problems. The use of untreated sewage can result in risks to human health. In Hanoi, all domestic, industrial, commercial and urban agricultural waste that drains into the urban waterways flows through the district of Thanh Trì. Natural water systems have a biological self-purifying capacity to mineralise organic waste as long as the oxygen requirement does not exceed the oxygen availability. If, for example an excessive quantity of raw sewage is introduced into a system, the biological oxygen demand (BOD) increases as the aerobic micro organisms convert the organic nutrients to minerals, carbon dioxide and water. The process consumes oxygen at a rate higher than can be naturally provided by the system, anaerobia results and leads to the virtual destruction of the ecosystem. The natural aerobic breakdown of faecal waste has been utilised by small communities as a self-purifying method of sewage treatment since antiquity. The system is effective as long as the balance is maintained between BOD and oxygen availability.

Very little systematic water quality monitoring has occurred in Hanoi and less in Thanh Trì. There are no facilities in the district to test the nutrient levels in the water although other research centres have provided occasional test results[5]. The water quality in the Tô Lịch

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particularly on construction sites, or where vegetation has been removed.

[5]The Health Service Committee of Hanoi have found very high Coliform counts in their regular pre-post summer inspection. Intermittent research on water quality has been completed, the Institute for Aquatic Resources, The University of Hanoi and Centre for Hygiene have provided reports occasionally to the Thanh Trì administrators.

River has been studied on a number of occasions by various agencies and institutes and is very poor in terms of the standard indicators of pollution[6]. For example the level of dissolved oxygen (DO), which is one of the principal indicators of a river's health as it demonstrates its potential to support aquatic life, is consistently low or zero, the result of a high nutrient load. The decomposition of these nutrients and their consumption by algae consumes available oxygen, leading to eutrophication. The DO for the Tô Lịch ranges between 1.3-4.6 mg/l which is very low, as 3mg/l is the minimum for the survival of aquatic life (Romney and Nasoff 1972). The historical evidence suggests that the Tô Lịch was once a productive source of fish and other types of food. This is not the case today. The other parameters, including a very high Biological Oxygen Demand (BOD_5)[7] of 50-150 mg/l, indicate that the water quality is too low to self purify (Mai Đình Yên , Interview, 2 November 1993) (see also Appendix C).

6.3 The History of Wastewater Re-use in The District of Thanh Trì

The potential value of deliberate utilisation of the wastewater from Hanoi was not recognised by the government until the late 1960's, when the food security of the city was coming under threat from the increasingly frequent US bombing of the port city of Haiphong and the roads leading to Hanoi. Although the city was largely evacuated, many thousands continued to live and work in the city and many more in the surrounding districts. A number of local initiatives were taken to contribute to the food supply, including the cultivation of the nature strips along the city's roads[8]. Despite the success of

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[6]The People's Committee of Thanh Trì wishes to incorporate a program of environmental monitoring, particularly of the water quality in both surface and ground waters.

[7]BOD_5 (Biological Oxygen Demand5) is the amount of oxygen consumed and measured over 5 days. Levels of 2-3mg/l is considered an indicator of significant pollution (Romney and Nasoff 1972).

[8]Beresford and Fraser (1992: 4) suggest that, in general, more traditional organic agriculture was used by necessity during the war due to reduced domestic production of chemical fertiliser.

these schemes, a reliable supply of protein remained problematic. A team of researchers led by Professor Mai Đình Yên[9] of the Biology faculty at the University of Hanoi responded by suggesting that the aquaculture potential in the Hanoi area could be boosted by utilising the nutrient load of the four rivers that drain Hanoi. Fishing in the Red River and the other minor rivers had been traditional practice from antiquity but catches were very limited and insufficient for the protein needs of Hanoi. According to the proposed aquaculture scheme, the wastewater of Hanoi, including all sewerage released into the rivers, became the liquid fertiliser for fish farms in the downstream district of Thanh Trì.

Professor Mai's team convinced the city authorities of the value of such a managed aquaculture scheme for Hanoi/Thanh Trì. The effluent in the rivers was predominantly domestic, therefore the risk of toxic contamination to human health was considered minimal, and bacterial and viral pathogens would be controlled by primary treatment in the first pond. Also, the risk associated with pathogens was reduced because the low flow rate through the system meant that the wastewater was partially self-treated before it reached Thanh Trì. For the scheme to be successful, it required a significant investment by the State, both in terms of human resources and equipment.

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[9]Mai Đình Yên based his work on Chinese material where the use of wastewater is a traditional practice in aquaculture. 'The use of ponds for receiving and purifying sewage and manure from nearby villages or towns while culturing fish (in east, central south and south China), has been documentarily verifiable practice with a long history of more than 2000 years' (Baozhen 1987: 51). The technology was commonly used in the Pearl and Yangtze valleys (Alam 1977: 23).

In 1969, the team calculated that 20 million m^3 of effluent flowed into Thanh Trì per year (Mai 1992: 1). At that time the nutrient load of the rivers was relatively light, as the population was much reduced due to the war time evacuation. The current estimate is 40 million m^3/year. The target for fish production for the whole district was 1050 tons/year, to meet the protein requirements for those who remained in Hanoi.

The team from the University of Hanoi investigated the optimum conditions and species for the aquaculture system. The team tested various local and exotic species of fresh water fish in various concentrations of effluent. The traditionally raised local species such as carp were tested for survival and weight-gain performance against the *Tilapia mozambiqua*, a tropical African species introduced by the French during the colonial period. The productivity of the Tilapia was higher than the carp, although the Tilapia proved more sensitive to the cooler winters of Hanoi. It was, however, also more tolerant of a reduced oxygen environment, which is typical in effluent-fed ponds. Therefore the Tilapia was chosen as the preferred species and a regime of aquaculture and agriculture was developed that compensated for the weakness of the fish in the winter, by splitting the year into a long aquaculture season and a short winter rice crop.

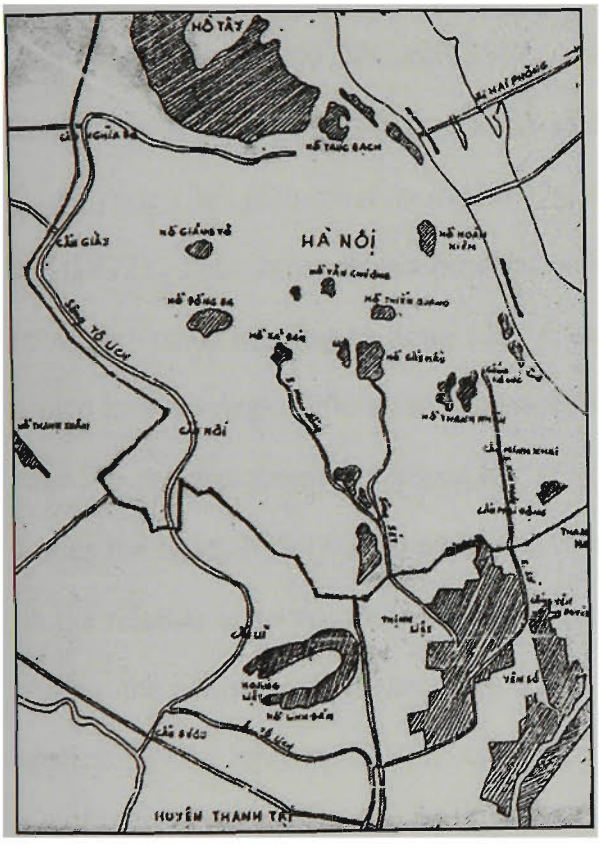

Figure 3: Professor Mai's original 1969 sketch map of the lakes and rivers of Hanoi. Significant ponds are shaded. (Mai 1992)

Up until 1974, the use of wastewater was limited by the number of pumps so the ponds were predominantly flooded by gravity, nevertheless, productivity reached 1.2-1.5 tons/ha. By 1975 the use of pumps increased, with a subsequent increase in the productivity to 3-3.5 t/ha. Since Professor Mai Đình Yên's pioneering work, Thanh Trì has developed a tradition of direct recycling of nutrients, from untreated sewage in the urban water system, as a fertiliser input into the production of rice and aquaculture.

Only very limited systematic research to improve the productivity of the wastewater re-use technology was carried out until 1992, when a collaborative project between the Peoples Committee of the District of Thanh Trì and the University of Hanoi held the *Hội Thảo Sử Dụng Nước Thải* (Symposium on the Use of Wastewater) in 1992 (Đại Học Tổng hợp Hà Nội 1992). This symposium brought together the most comprehensive research on the scientific issues relating to aquaculture, such as the potential health impacts of eating fish grown in wastewater and descriptions of the river and pond ecosystems. The symposium aimed to present scientific research that would assist the district to boost production and reduce the risks. It did not consider the broader policy implications, and other than a paper on the relative economic merits of different species, the symposium did not examine or analyse the economic dimension of the industry, nor did it consider the potential for the application of a large scale VAC type approach. It remains, however, the premier scientific description of the generation of wastewater in Hanoi and consequent re-use of that water in Thanh Trì .

6.4 Wastewater: Pollution or Resource?

Fundamental to the opportunity for SD, is that the wastewater be considered as a sustainable resource rather than a pollutant. The wastewater from Hanoi, which is a combination of sewage, domestic grey water and liquid factory waste, is the main pollutant which flows through Thanh Trì. Both the People's Committee of Thanh Trì and the

farmers are concerned about the impact of the wastewater. It is clear that only those contaminants in the rivers that do not contribute to the productivity of the aquaculture industry in Thanh Trì should be considered as pollution. The unique character of this case, and a crucial issue for the development of environmentally sound development policy, is that while the release of organic waste into the rivers and ponds of Hanoi is technically pollution and does have a serious impact on the 'natural' ecosystem, the waste is considered as a resource because it is useful. Pollution is, by definition, any substance or phenomenon which is unwanted. However, for sewage and organic wastes to be beneficial they must be managed appropriately.

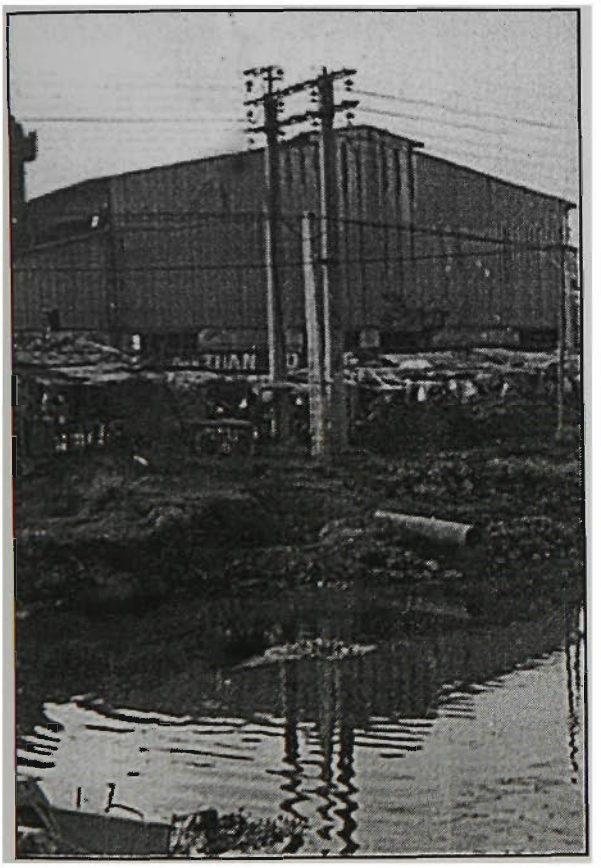

Plate 2: Typical Hanoi factory with drain directly to river.

Little is known about the liquid by-products of industrialisation in Hanoi and the subsequent pollution of the rivers. The Hanoi Environment Committee (HEC) believes that little or no on-site treatment is occurring[10], therefore all liquid wastes are being drained into the system and entering the city's lakes and rivers. Liquid waste can be divided into two groups, harmful and beneficial. Those liquid wastes which are beneficial to farmers are those which provide nutrients, like domestic and food processing waste.

[10] Some hospitals within Hanoi do maintain rudimentary on-site treatment.

The second group of liquid wastes are the toxic chemical compounds, both organic and inorganic, that have a negative impact on wastewater re-use. These compounds may be naturally occurring materials, which have been concentrated during respective industrial processes, and are now at 'unnatural' levels in the environment. The industrial waste of Hanoi contains heavy metals such as lead, mercury, chrome, and cadmium (Trung 1992: 3). Although Hanoi's level of industrialisation is relatively low, those factories that are operational include leather processors which produce chrome, particularly Cr_6, and battery factories which release both lead and cadmium. These three metals have serious health impacts if ingested in sufficient quantities, or over long periods of time. Heavy metals bio-accumulate in organisms within the streams, canals and ponds reaching maximum biomagnification in the fish grown in the ponds, and ultimately contaminating the consumers. All of these metals have deleterious effects when released into the environment. Similarly, the rapid increase in household and small shop based industry such as dry cleaning and photographic processing in Hanoi, is another source of noxious and toxic water pollution that is currently not monitored.

The lakes and ponds of Hanoi act as primary treatment lagoons in the wastewater. The water in the canals putrefies and becomes eutrophic, turning black in colour, producing methane, hydrogen sulphide and carbon dioxide[11] (see Plate 3). The odour can be overpowering and is of aesthetic concern to the Hanoi People's Committee. The relatively low flow rate in the drainage system during the dry season transforms the rivers and ponds into 'sedimentation tanks' and anaerobic respiration begins in the thick sludge, with an estimated annual sedimentation rate of 13000m^3 (Trần and Dương 1990: 3)[12]. The flow

[11]Both these gases are contributing to the enhanced Greenhouse Effect. Both are inevitable by-products of anaerobic organic decomposition.

[12]Very little study has been undertaken into these variations and the impacts. Most water quality studies that have been completed were not done over a whole seasonal cycle, so little is known of the perennial variation. During the period the wastewater is in the canals and rivers the whole network operates as a treatment works and, consequently, improves the quality of the wastewater in-situ.

rates in the drains directly affect the quality of the water that reaches Thanh Trì , not only with regard to the dilution of the water, but also to the decomposition that occurs in the drains. For example, a higher flow rate carries the wastewater through the system more quickly, therefore the degree of decomposition is less, with a consequent increase in the quantity of pathogens reaching Thanh Trì.

During the dry season insufficient wastewater reaches Thanh Trì for the irrigation pumps to operate at maximum efficiency. The farmers are aware that boosting the flow rates during this period will increase average annual production rates in Thanh Trì. These flow rates will rise as a result of increasing water consumption in Hanoi, although the Hanoi People's Committee are concerned about the levels of water consumption and have, in the recent past, initiated public education campaigns to promote the conservation of water. Experience in other countries has shown that water consumption tends to rise as a result of increasing access to reticulated water systems, therefore, it is expected that as more homes in Hanoi have a piped supply, consumption will rise, and consequently, flow rate of wastewater will rise.

6.4.1 Other Sources of Water Pollution

The Tô Lịch River is known to contain high levels of copper and mercury (see Appendix C, Table 1) which are common by-products of gold processing. Compounds of silver are also discharged from photo-processing laboratories. Atmospheric fallout from factory-generated air pollution has caused particularly high levels of heavy metals in the soil around Văn Điển in Thanh Trì[13]. This is an issue in relation to the local water quality because

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[13]There has been some evidence (1997) that a number of particularly noxious factories have been forced to close (URL: http://coombs.anu.edu.au/~vern/avsl.html.au).

metals in soil tend to either leach down to the groundwater or are carried by rain into the surface water and consequently into the food chain (see Appendix C, Table 2).

The sludge which collects on the beds of rivers, lakes and canals in Hanoi and the ponds in Thanh Trì can be a rich source of nutrients but also a repository of toxic materials. The spreading of sewage sludge as a fertiliser on farm land is a very common practice throughout the world, although it is the subject of much conjecture in terms of health legislation (Saabye 1994: 26). Some countries, in the west for example, Britain, France and Australia, have restrictions on the spreading of sludge because of the heavy metals and dioxin usually present. There is no restriction on the agricultural use of sludge in Vietnam, nor is it regularly tested. The problem is that while biological hazards such as pathogens will reduce in time, heavy metals and dioxin will run-off into surface waters or enter into the soil and leach into groundwater (Saabye 1994: 26). These materials are fat soluble and tend to bio-accumulate in the food chain. It is imperative that the wastewater be free of toxic pollutants and only contain beneficial biological ones. The NPESD (SRV 1992b) section on Clean Technology (see chapter Six, section 6.4.4) is an attempt to achieve this.

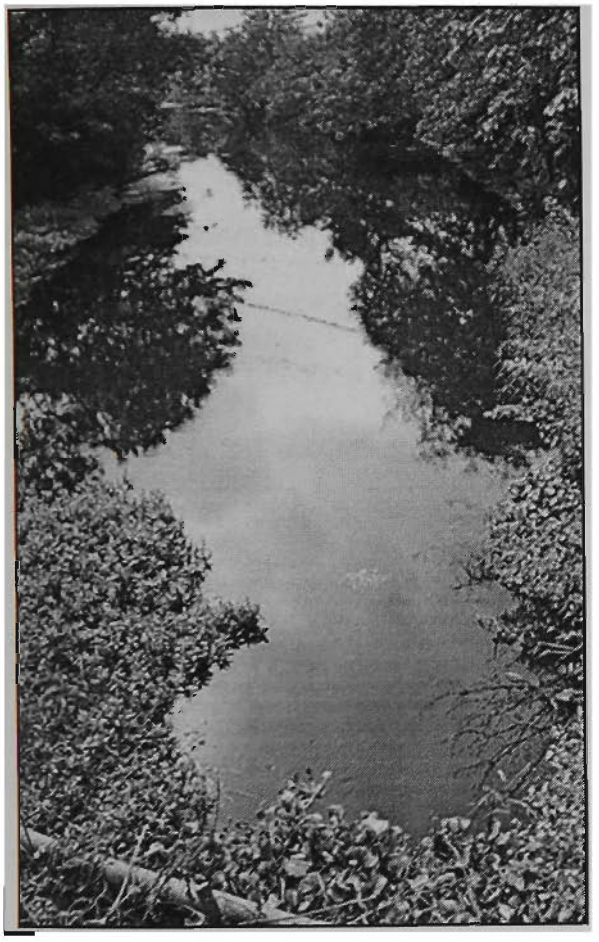


Plate 3. The Sét river as it flows through the National Economics University. The water here is highly turbid and eutrified.

It would be inaccurate to label all industrial pollution as unproductive to agriculture and aquaculture. Much of the waste from the food and beverage processing industries provides a large nutrient load, which although this reduces the water quality in terms of BOD, adds to the productivity of the water to the farmers. Likewise, not all household waste is innocuous or organically beneficial to the farmers. As described above, the pathogens in sewage are of primary concern in terms of health impacts. These pathological contaminants can be treated using lagoon or artificial wetland type systems, and are currently treated, in part, by the retention of the water within the system before it reaches the farmers. An increasing number of small industrial enterprises based in the household are adding to the potential number of points of pollution. A large number of individual polluters are defined as a diffuse source, as it becomes increasingly difficult to identify individual polluters. Control of diffuse pollution is difficult for regulators to establish, particularly within a top-down bureaucratic structure. The most effective pollution control policy is raising awareness in the community of the impacts of pollution.

Another significant source of pollution in the rivers that flow through Hanoi is the pollution in the Red River upstream of the branch of the Nhuệ river. Vĩnh Phú province north of Hanoi has a litany of water pollution problems in particularly around Việt Trì, the provincial capital, which is heavily industrialised (Phạm Quang Trứ 1992: 4). The Bai Bung paper factory is the largest single enterprise (see chapter Two, Section 2.4). Other factories include cement, brick making, metal refineries and battery factories. This area has the highest concentration of noxious factories in Vietnam. Nguyễn Trong Chuan (1992: 3) reports that '100 tons of sulphuric acid, 400 tons of hydrochloric acid 1300 tons of sodium hydroxide' is typical of the waste that is released annually from the Việt Trì industrial area in Vĩnh Phú province.

None of the industrial enterprises in Vĩnh Phú have any form of waste treatment before they discharge their waste into the air or rivers (Trần Yem, Interview, 21 October 1992). All the drainage from the Province of Vĩnh Phú enters the Red River. In the 30 kms of Red River between Xuan Huy and Việt Trì, highly polluted effluent enters the Red River at seven points and totals 150,000m^3/day. Sulphurous compounds are always in high concentration. ranging from 0.15 to 2.7 mg/l (Phạm Quang Trứ 1992: 2). These levels are above the State Hygiene regulation level of zero in surface waters. All other parameters of water quality, pH, BOD, organic compounds and heavy metals, continuously exceed the standard. This section of the Red River is upstream of Hanoi and some of this water enters the Nhuệ River which flows through Hanoi and Thanh Trì. The pollution in Vĩnh Phú therefore affects the water quality in Hanoi and Thanh Trì. The Red River also provides part of the recharge water for the aquifer under Hanoi and consequently impacts on the quality of the water supply of Hanoi .

6.5. Health Impacts of Wastewater Re-use

6.5.1 Water Quality and Human Health

Balancing the benefits of utilising the wastewater flowing through Thanh Trì as a rich source of nutrients for rice and aquaculture with the potential deleterious health effects of toxic pollution is essential if a sustainable outcome is the goal. The wastewater from Hanoi contains a number of harmful substances, including pathogenic micro-organisms, dangerous levels of heavy metals, toxic inorganic compounds, as well as the potentially beneficial nutrients. The ratio of these harmful substances to beneficial nutrients depends mainly on the activities in the catchment and the amount of treatment that has been applied to the waste before it is released. In Hanoi, the level of industrialisation is relatively low, but the technical sophistication of that industrialisation is also low, therefore the industrial processes that are being used are generally more polluting. Compounding the problem is

the complete lack of operational on-site treatment at industrial sites or 'end of pipe' municipal treatment.

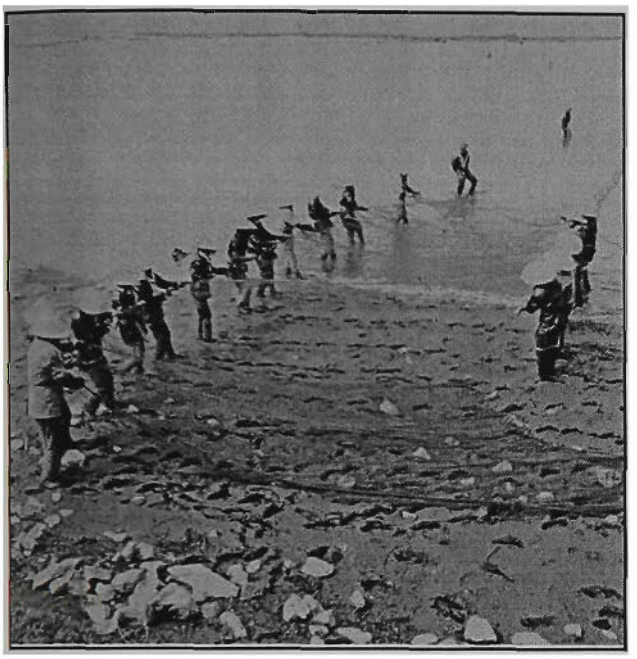


Plate 4: Fish Harvesting in Thanh Trì. Note the water level of the pond has been reduced.

The use of wastewater for agriculture and aquaculture has three principal health risks, firstly, to the workers involved in its application (occupational risk), secondly, to the consumers of the products produced by its use (consumer risk), and thirdly, to the residents in the area where the wastewater flows or is utilised. The diseases most frequently transmitted by the utilisation of wastewater and sewage used for irrigation and aquaculture are typhoid, infectious hepatitis, fascioliasis and cholera. The impact of the use of wastewater in Thanh Trì on the health of the people in the district is a complex issue.

There are the more specific impacts from the direct use of the water from the ponds or canals on the health of rural workers compared to the general population. The issue of the health impact on workers must be considered on a number of levels. There is no doubt that working often chest deep in the wastewater is having a very real impact on the health of workers. The village administration in Yên Sở recognises that workers who are directly exposed to strong concentrations of the wastewater contract skin and eye infections. The eye infections, they suggest, are caused when workers wipe sweat from their brows as they work. The nature of the work means that the workers' hands are often immersed in the highly concentrated wastewater. This condition affects men disproportionately as male

aquaculture workers have more contact with the wastewater in the earlier phase of its use when it is at the highest concentration. Women workers are involved during the harvest phase when the bacterial population of the wastewater has depleted. The workers do not wash in the water because of the known danger of infection, nevertheless, the high incidence of skin and eye infections continues to afflict them.[14]

6.5.2 Wastewater and Children's Health

The relative smallness of the children in more southern areas of the district has been noted by other observers and is of concern to the district health authorities but remains unexplained (Foley et al,.1989: 46). The Australian project assessment team which visited the area in 1989 noted the relative smallness of the children and the poor condition of the housing. Their report noted that 'this was one of the poorest locations visited by the team during the mission'. The Vietnam Living Standards Survey 1992-1993 (SRV 1994) found that 30.42 % of children nationally up to the age of twelve were suffering slight malnutrition, and 5% suffered severe malnutrition[15]. A further possible indicator of poor environmental conditions is evident in the district of Thanh Trì's health records which show that 60%-70% of live births are smaller than might be expected, even in the northern area of the district (Dr. Kí, Director of the Thanh Trì District Hospital, Interview 4 January 1993). The cause of this phenomenon is not known as these villages are relatively wealthy, and nutrition in terms of protein and calcium intake is high. There has been no formal research, but Dr. Kí believes the problem to be water-related because the families in the

[14]The village of Trấn Phú reports much fewer skin infections, and this attributed to a smaller number of workers in this village that need to be in direct contact with the wastewater ponds.

[15]The Vietnam Living Standards Survey 1992-1993, Table 3.6.6 (SRV 1994: 95) 'Z-Score Weight for Height by Age', used the World Health Organisation threshold for malnutrition in children of < 2 standard deviations = slight malnutrition, < 3 standard deviations = severe malnutrition.

village make some use of the polluted water for irrigating home gardens, and washing vegetables, clothes and themselves, and that this affects, in some way, the weight gain in the unborn[16].

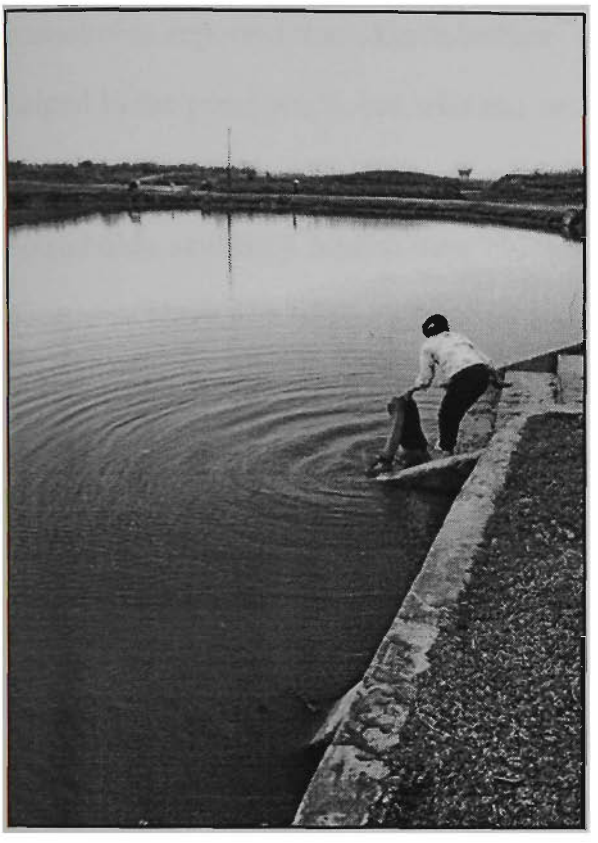


Plate 5: A pond in Thanh Trì being used for washing clothes.

Another issue is the very high proportion of children with gastro-intestinal parasitic infections,[17] which it is assumed by the district health service to be caused by either the children's direct contact with water during play, or that food preparers are using contaminated water for washing vegetables. The district planning office believes that children commonly swim in the Tô Lịch river which is heavily polluted. Those children who had no direct contact with wastewater but still suffered from intestinal infections had, it was assumed by the village management, played in soil fertilised with 'night soil'.

The household survey, which is indicative rather than conclusive, included a section that related to children's health and this revealed that 15 of 52 households reported that their

[16]According to the Vietnam Living Standards Survey 1992-1993, Table 3.7.6 (SRV 1994: 103) 'Average weight of Newborns by Age Group of Mother, Expenditure Quintile, Rural/Urban and Region', there is a positive correlation between wealth, as measured by expenditure, and birth weight. In addition average birth weight by region shows the Red River Delta to have an average birth weight of 2.98kg which is slightly above the national average of 2.95kg.(SRV 1994: 103)

[17]About 70% of all children in Hanoi are infected by intestinal parasites (for example tapeworms) SWECO Report, Executive Summary, (1993: 1). The report does not give its source for this figure.

children played or swam in the canals, ponds or adjacent river. Of these, 5 reported skin or eye soreness that lasted for 2 or more days. This may suggest that some children, or their parents, are unaware of the potential danger of playing in or near the wastewater. A connection between infections and aquaculture work is indicated as fourteen of the 52 households reported that skin infections and sore eyes occurred in the older children that helped in the pond work, but who did not otherwise come in contact with the pond water. The strongest indicator of gastro-intestinal infections in children was that 51 of the 53 households said they treated their children with worm powder, at least once a year[18]. The questions 'Have any of your children suffered chronic illnesses or conditions?' and 'Have your children experienced any learning difficulties?' were asked to test for indicators of the effects of long term exposure to the heavy metal ingestion. In such a small sample no definitive results were expected, nevertheless, in Yên Sở three households reported children with unspecified neurological disorders and in one case this had been fatal. With no control group for comparison no conclusions can be drawn from this data, nevertheless the wastewater and soil in the area is known to have heavy metal contamination and these do cause developmental and neurological disorders. It is an issue that requires urgent further study. One other child in Yên Sở had died of an unspecified 'blood disease'.

These health problems, which Dr. Kí the Director of the district hospital, and Dr. Tuấn, Director of the hospital's pharmacy department believe, are at least partially, caused by contaminated groundwater, are the rationale behind the local authority's request for a reticulated potable water supply. Despite their argument that there is a link between the quality of the groundwater and adverse health impacts on the population, the state water supply company has rebuffed such requests as 'too expensive'. The local government of

[18] Such a high level of worm powder consumption may demonstrate a high level of consciousness about the issue , although as there is no control group and no national figures available it is not possible to suggest whether such levels are unusual or not.

Thanh Trì has estimated that 1.5-1.8 million dong would be necessary for the construction of an extension of the water pipe from the southern end of the reticulated system in Hanoi, which is the preferred option (Thanh Trì Engineer Tâm, Interview, 10 November 1992). Deeper wells could be built in the area to increase the quantity of water, but the district engineer and the director of the health service were both dubious about the quality of the ground water, because it too would have been contaminated by the wastewater that has been running through the district over time. Underground water quality is also often low due to natural contamination from iron or salt and may need further treatment requiring additional expense.[19]

6.5.3. Human Health and Agricultural Pollution

Lê and Rambo (1993) have referred to the over-use of agricultural chemicals in Vietnam as the principal factor leading to a reduction in the sustainability of agricultural production, a view consistent with other authors in the field of sustainable agriculture (Mollison 1993, for example. See also chapter Two, Section 2.3) In Vietnam, the introduction of new agricultural technologies, such as improved varieties of rice, has also led to increased dependence on pesticides and chemical fertilisers.

Table 1 Average increase in chemical fertiliser use since 1976 per hectare. (Nguyễn Tri Khiem 1996: 34)

Average	1976-81	40kg/ha
	1981-88	120kg/ha
	1988-92	142kg/ha

[19]To reduce salinity expensive equipment is required.

Table 2 Total chemical fertiliser use for 1985-93 (Nguyễn Tri Khiem 1996: 33)

Year	1985	1990	1991	1992	1993
Chemical Fertilisers (1,000s tons)	1,819	2,643	3,166	3,239	3,250

Pollution from these chemicals is significant within Vietnam in general and within the case study area in particular. In major campaigns by the government to increase the national rice crop, the use of chemical pesticides and artificial fertilisers has increased significantly over the last twenty years (see Table 1&2 above).[20] The use of artificial fertilisers in Vietnam is now approaching similar rates to other Southeast Asian countries. The increasing use of artificial fertiliser is used by some analysts (for example the World Bank Group) as a measure of 'development', despite the negative impacts chemical fertiliser has on the environment and on the long term fertility of the soil and, therefore, the economy. As described in chapter 2, the application of such fertilisers progressively diminishes the opportunities to develop more sustainable practices, as the addition of nitrogen based fertiliser reduces the number of soil microbes which contribute to natural soil quality.

If nitrogenous fertilisers are applied at levels beyond that which can be metabolised by the soil fauna and the plants, high levels of nitrite in the vegetables result. Consumption of these vegetables can lead to methemoglobinemia (Blue Baby Syndrome), particularly in children. The world's average fertiliser application rate is 95.4 kg/ha, however, in the intensive vegetable growing areas around Hanoi, the rate is 372.5 kg/ha (Phạm 1992: 4). The WHO standard for NO_3 in vegetables should not exceed 300mg/kg. Phạm suggests that Vietnamese farmers, who have unrestricted access to fertilisers and a strong

[20]Nguyễn, Cong Thanh 1993. Ironically the importation of fertilisers fell in 1993, down 5% on 1992. Pesticides importation grew by a disturbing 115% over the same period (Fforde 1994: 35).

commercial incentive, have produced vegetables with extremely high levels of NO_3, up to 867 mg/kg in cabbage, for example (Phạm Bình Quyên 1993: 4). Subsequently, the nitrogen levels in the Tô Lịch River are very high. The indiscriminate use of chemicals with adverse and long lasting ecological effects beyond the target species, has led to a reduction in biodiversity.

Of immediate concern is the number of reported human poisonings, that occur throughout Vietnam: 4,572 in 1992 (ibid). The quantity of pesticide used in Vietnam varies from region to region and depends on the type of agriculture, although the quantity is generally high and has been increasing[21]. Of particular interest here are the amounts used in the Hanoi area. According to the Hanoi Environment Committee (Phạm Bình Quyên 1993), farmers in the vegetable growing area of Tay Tuu, near Hanoi, use between 6.5-9.5kg/ha of pesticides. Such heavy use of pesticides could be avoided if the principles of biological pest control were applied. The use of chemical pesticides can, potentially, be zero in a permaculture/agroforestry system. The current regime of chemical use in Vietnamese agriculture is another example of increasing chemical dependency, and dependency on imports with the consequent proliferation of the agrochemical industry to attempt to maintain soil productivity. This type of agricultural development is an example of weak environmental management.

The relationship between the use of chemicals in agriculture and the political economy is one of dependency. The tendency is toward increasing the use of chemicals and, therefore, increasing the cost to farmers, decreasing natural soil fertility, increasing pollution from run-off and leaching, which extends the cost of chemical use to people and ecosystems downstream of the farm. The increasing dependence on chemicals requires increasing

[21]AusAid announced (1997) a scheme to educate all farmers in Vietnam about the dangers of chemical pesticide use and the advantages of biological pest control (http://coombs.anu.edu.au/~vern/avsl.html).

production or importation. If fertilisers and pesticides are imported, this adds to Vietnam's national debt and the ecological impact of transferring nutrients from one country to another which results in a net loss of nutrients in the supplier country. The additional transportation adds to pollution and direct financial costs to the final consumers. The application of agricultural chemicals is, therefore, an example of poor environmental practice.

6.5.4. Aquaculture and Human Health

The officials in the district of Thanh Trì are concerned about the exposure of the aquaculture workers to unknown contaminants and the exposure of the whole population to contaminated groundwater, which they understand can be polluted from chemicals that are released into the rivers. The household survey, conducted as part of this thesis revealed a very strong concern throughout the sample population about the pollution in the wastewater, although farmers cannot stop using it within reducing their productivity. Of the 51 households who expressed their concerns, 34 were worried about the negative impact of the wastewater on themselves and on their cattle[22]. One respondent added 'that the government should treat the water so it contains less poison'.

Twenty-nine of the 45 respondents to specific questions in the survey were concerned about working directly with the wastewater. In Thanh Trì women are equally involved in the harvesting of the fish, a task that often requires them to be immersed up to their waists in the wastewater. This activity, it is assumed, contributes to vaginal infections. Of the 23 women who had been involved in fish harvesting, 8 reported vaginal infections of some kind during the harvest period and 4 respondents believed these to be associated with the

[22]A number of the richer households in the District of Thanh Trì keep a small number of dairy cattle for milking. The excess milk is sold in Hanoi for yoghurt and ice cream production.

fish harvest. No women surveyed from the village of Trấn Phú worked in the ponds and none surveyed reported vaginal infections.

Of the 59 households who responded to the question 'Does any member of your household get sore skin or eyes after working in the ponds?', thirty-one said 'yes' and stated that these conditions lasted at least 3-4 days. These impacts on the health of the workers in the aquaculture industry can largely be avoided by the use of different techniques and some basic equipment such as waders, gloves and protective eye wear. Most of the farmers wrap their legs in puttees or gaiters, believing that this practice will protect their legs, but these are not waterproof. Many farmers suggested that a powered boat would help them avoid contact with the water. Boats are used for some parts of the aquaculture process, and some villages have small rowing boats or punts, however the harvesting with the current size nets would require a vessel of such displacement and power as to be impractical. The bulk of the contact with the pond water occurs during the harvest when the water is drained to about one meter in depth and long nets are dragged through the ponds (see plate 4). Once the fish are penned into a small area women, standing waste deep in the ponds, transfer the fish to baskets using hand nets. Chest high waders could protect the workers from the pond water, but are relatively expensive.

Many farmers, about half of those surveyed, expressed significant concern about the negative impacts of the wastewater on the health of their families and their livestock. The most common comment was the lack of information available about the chemical or toxic composition of the wastewater. The interest of the farmers in the composition of the wastewater is understandable given their response to the question, 'Have you noticed any unusual developments in your fish stock?', to which almost all (49 affirmative responses out of 53) related cases where fish had died in large numbers. More disturbing were the cases of mutation in the fish. Six farmers, all from Thịnh Liệt reported instances of fish

with extra fins, tails or eyes. Although a substantive conclusion cannot be drawn from these results such mutations in aquatic species can be indicative of the presence of heavy metals and other toxins.

6.6. Ecomomic Impacts of Utilising the Wastewater

6.6.1 The Process of Wastewater Use

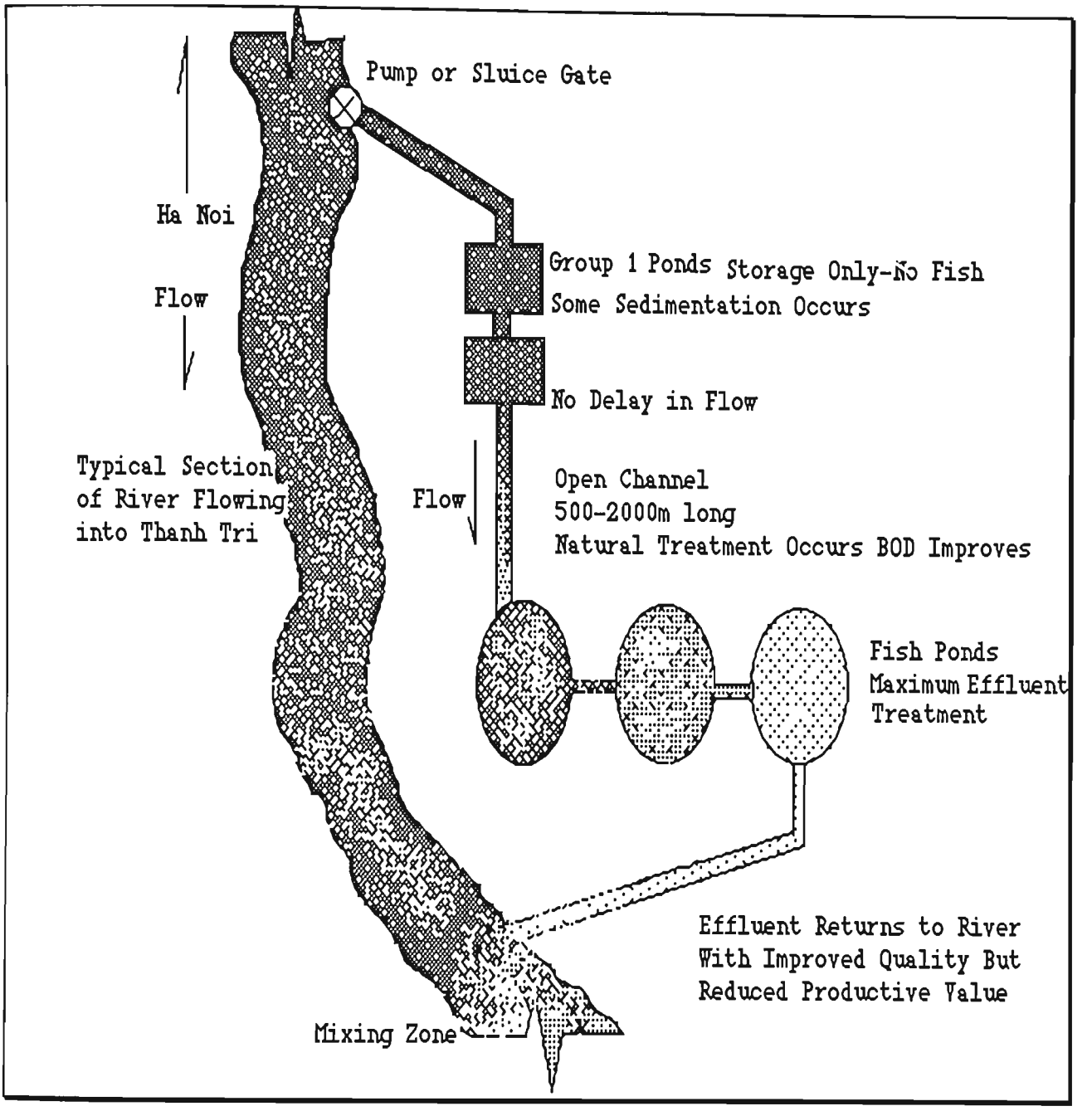
The quality of the wastewater flowing through Thanh Trì is visually assessed by the farmers. Likewise, they assess the amount of wastewater to pump into the ponds in the same way. The most appropriate colour indicating good quality wastewater, is described by the farmers as a slightly dark colour. All farmers surveyed in Thịnh Liệt, Yên Sở and Trấn Phú use the appearance and smell of the wastewater as an indicator of concentration. A few farmers added that 'green is good, black is bad', when referring to the nutrient quality of the wastewater. If the concentration is too high, indicated by a black colour, the water is not used. Various shades of green indicate organic richness, while it is understood that water which is yellow or red indicates chemical contamination.

While such a simple monitoring process appears appropriate for the assessment of general nutrient levels and visually obvious toxins, such as the dyes released from textile factories upstream, it is insufficient to detect serious but invisible pollutants. Twenty-four of the fifty farmers who responded to the question 'Have you noticed any unusual colours in the wastewater?', reported seeing a red colour in the water which most associated with the effluent from one of the upstream textile factories. Almost all the farmers reported noticing various colours in the water and thought these were indicators of pollution from unspecified factories in Hanoi. Eight farmers reported that they had seen an oily film on the wastewater. Sources of oil may include vehicle and industrial lubricants, either deliberately dumped, or that which is washed from roads and vegetable or animal oils from domestic and commercial kitchens and tanneries. The environmental impacts from oils depends on the type, however, all oil released into water changes the surface tension of the water and this can interfere with various ecological processes. The benzene in some oils is a known carcinogen in humans. The existence of oil in the wastewater is of no benefit.

The fish farmers refer to the wastewater as the 'gold' water, referring to the 'value' of the water rather than the 'colour'. During the rainy season, August to September, they run the pumps every day. By October/November, the fish growth rates have increased and the farmers increase the ration of wastewater to compensate for the increasing nutrient consumption by the aquaculture process. The pumping rate is increased to 20 hrs/day equivalent to 270 m^3/hr/10 ha. The pumping rate is monitored by observing the behaviour of the fish and adjusted appropriately. For example, if the fish become distressed, such as gulping at the surface for air, this indicates a net reduction in the dissolved oxygen and the pumping rate is reduced. The farmers either change half the pond water at a time, or one third is pumped out and then replaced with wastewater from the canal. It is known by the farmers that a mix ratio of one in five will increase production and a mix of one half will kill the fish stock. A seasonally dependent ratio of 25% wastewater to 'clean' water is optimum.

Figure 4 (overleaf) shows the schematic arrangement of the ponds and canals within the aquaculture system in northern Thanh Trì relative to one of the rivers delivering the wastewater. The degree of shading refers to the concentration of organic material available. This concentration declines as the nutrients are converted to other materials during the wastewater's retention within the system.

Figure 4: The schematic arrangement of the pond system and typical wastewater flow in Thanh Trì (Not to Scale).



(Source: Based on sketches made by Professor Mai Đình Yên during interview in Hanoi, September 1992)

Farmers calculate how long to leave the water in the ponds by the colour of the pond water. When it changes from green to yellow the water is drained. Occasionally, massive and inexplicable fish kills occur. The cause is not identified though it is thought to be hot

weather and too high a concentration of wastewater in the ponds. Mass fish kills in the West are often caused by the release of a particular toxin. Given the uncertainty this is an area that requires urgent attention. Adequate dissolved oxygen levels are critical to avoid eutrophication and are needed to maintain a healthy environment for the fish and the various macrophytes which are consumed by them. The farmers would like to be able to monitor sewage levels in the incoming canals in order to optimise the pumping times and 'quality' of the waste from a fertilising point of view. According to the household survey most farmers wanted more pumps in order to increase the amount of wastewater used and also to have more individual control over the cooperatively owned resource.

Plate 6. The Kim Ngưu Drain upstream from Thanh Trì during the dry season showing low flow rate, high nutrient load and evidence of eutrophication.

The principal issues for the aquaculturists in Thanh Trì are the quality and quantity of the wastewater. In the rainy season, the increasing flow rate flushes the organic sediment

downstream, increasing the BOD[23] to above dry season levels. The effluent in the four rivers flowing through Hanoi is not, therefore, any more diluted. In contrast the concentration of industrial pollution is diluted by the increased flow rates, and therefore the threat from these chemicals does decline. Throughout the system, a degree of bio-degradation occurs in the canals and rivers. The extent to which this process has occurred before the effluent reaches Thanh Trì is directly proportional to the time it takes for the wastewater to reach Thanh Trì. The result of this phenomenon is that the quality of the effluent in terms of BOD, E-coli[24], nitrogen and phosphate load is affected by the period of time the wastewater takes to get to Thanh Trì. Therefore, if the effluent was interrupted by upstream treatment systems, the aquacultural and agricultural productivity in Thanh Trì would be reduced. If the use of wastewater in Thanh Trì was formalised a management plan that allows for these variation could boost the productivity of the system.

6.6.2 Household Economies in Northern Thanh Trì

The three villages in the north of Thanh Trì district that have benefited most from aquaculture are Trấn Phú, Thịnh Liệt and Yên Sở. According to the respective village administrations in Thịnh Liệt and Yên Sở, about 80% of the income is from aquaculture and 20% from rice.[25] The northern region, fed by the nutrient rich wastewater, produces twice the rice harvest per hectare than that of the southern part of the district. The villages of Thịnh Liệt and Yên Sở in the north produce 5-5.5t of rice per hectare in one six month season per year (the other six months is dedicated to aquaculture, producing 3.5-4 tons/ha of fish). The crop in the south, however, produces 5t of rice per hectare per year, with two

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[23]Dry season mean BOD is 21 mg/l compared to the wet season mean of 44 mg/l. Source, Professor Mai Đình Yên. Interview, 2 December 1992.

[24]Coliform counts in Thanh Trì increase by the same process, higher flow rates carry the coliforms out of the sediment upstream.

[25]This ratio was an 'official' one, the real income generated by the village is difficult to ascertain.

growing seasons. Thịnh Liệt plans to increase the area of its surrounding ponds to 200ha. It currently has 11 of the 67 pumping stations in the district. There are plans to build more pumping stations in order to access more of the wastewater if it is available. Twenty-eight of the 47 respondents in the household survey said they wanted more pumps to increase the productivity.

Total fish production for the area is in the range of 2000-2500 tons/year and most of this is sold in Hanoi, but a significant proportion is for 'export' to China.[26] Since the reforms associated with *Đổi Mới* the farmers have become very interested in improving productivity, and have abandoned Tilapia in favour of the more profitable Indian Carp (*Labeo roho*) (Interview with Engineer Tâm, Thanh Trì 18 November 1992) Tilapia was not highly regarded in the market and was worth perhaps only 30% -50% of the market value of Indian Carp. The Indian Carp are not as productive in terms of growth rates but the higher market value per kilo compensates for lower growth rates. Indian Carp currently sells for 8000D/kg (1993 prices).

There is no question that, overall, rural family incomes have increased since the reform process began. The household survey, conducted as part of this study, found that 39 of the 49 households, who responded to the question, said their income had increased since 1988. Of the remainder, nine respondents claimed their income was the same and one household recorded a reduction in income for no clear reason, although this was a household of one young couple with two small children. The husband works as a labourer and they describe themselves as poor. Nineteen of the twenty households in Yên Sở, the village which receives the most concentrated wastewater, reported increases in their incomes. It is not possible to establish what proportion of the increase is due to improved

[26]It was apparent from my interviews that this was smuggled over the border in exchange for a vast range of products.

aquaculture associated with the use of wastewater, however, 23 of the 49 households which responded had other forms of income other than fish and rice farming. Of these, seven respondents reported that at least one female member of the household was involved in marketing farm produce such as fish, vegetables or fowl. Twelve households had one or more member working in Hanoi. Coupled with rising family income is an increase in social differentiation throughout the Red River Delta. There is now 'an elite 'rich' group, who increasingly control land and other assets, a middle peasantry and the poor' (Fforde 1993b: 53).

The land reform[27] in Thanh Trì allows for the division of the fields into small plots that are controlled by individual families. The families are free to produce crops of their choice. There is a dilemma caused by the physical nature of aquaculture, because, except for the dry season when many of the ponds are drained and can be divided as arable land, it would be very difficult and expensive to divide the ponds with partitions. Therefore the difficulty of transforming the aquaculture industry into a reformed land management system is that the ponds cannot be divided as easily as the land can. To overcome this, a contract is drawn up between the households and the aquaculture company (formerly the cooperative), at the beginning of each year. This contract sets the amount of labour and capital that each household will provide in the following season. From a distributive perspective, it was suggested by some respondents in the survey that this 'new' system favours rich and large families because they have more labour available and can more easily afford the rent for the ponds. The rent is not fixed but is determined by the market. If a number of people want to use the area, the rent is high. The situation now is that all the ponds are rented by

[27]Article 1, Land Law (1987) allows for no private land ownership. All land to remain under the administration of the state. The 1992 Constitution allows the state through the various levels of government to zone, lease and generally decide land use issues and disputes. (Gillespie, J. n.d. Short Course on Vietnamese Commercial Law Part 11: Commercial Law Affecting Foreign Investment Entities, Deakin University, Centre for Asian Business).

individuals from the local authority and the individuals receive the benefits of production according to their ability to contribute. The physical nature of the large ponds in Thanh Trì limits the development of individual family based VAC systems, on the other hand the large ponds provide for the development of more cooperative models of development.

6.6.3. The Political Economy of Water and Wastewater

In early 1994, a new company called the Hanoi Clean Water Supply Company (HCWSC) was formed by the merging of the three local authorities: the Water Resource Development and Investment Company; the Training School for Workers of Water Resources; and the Hanoi Water Supply Company. The new company is under the direct control of the City Department of Communication and Public Works. The HCWSC claims that '[B]y 1998, we will have to sell clean water to turn a profit and to refund our investment' (Vietnam Investment Review 1994: 22). Currently, Hanoi residents are charged VND600 per m^3 of water (1993 prices), this is very low compared to other countries. The HCWSC has not finalised a position on the commercial provision of sewage and drainage services, the result of which will have some degree of impact on down-stream users. The People's Committee of Hanoi remains the only regulator of price and other conditions of the service, including equity of access and environmental standards.

Water is a resource of enormous value to all life, nevertheless, the process of harvesting, distribution drainage and disposal all require significant investment and can have substantial running costs. Whether these costs are borne by the State, or supported by a user pays system, is one of the issues that is being addressed by policy makers worldwide. The recent trend throughout the industrialised world is toward the privatisation of public utilities as a manifestation of economic rationalisation. The theory that economic efficiency is best served under private ownership continues to be debated. The economic rationalist position unrealistically maintains that private ownership of a resource can improve

sustainability because it is in the interest of the owners to maintain the resource. For example, if the wastewater from Hanoi were 'privately owned' it would be in the interest of the owner to protect the resource and therefore the sustainable use of that resource, by either maintaining the nutrient rich quality of the wastewater, or enhancing it. Likewise, the owner would attempt to reduce the pollutant level in the waste stream in order to maintain the satisfaction of the customer, the fish farmers, and the confidence of the consumers of the fish. However, the 'owner' of this hypothetical system is centrally concerned with maintaining profits, not environmental outcomes. The principles of economic rationalism are inadequate to achieve a preferred environmental outcome. The economic rationalist position is that SD will be best served by an unfettered market (Moran et al., 1991). Therefore, according to this position, all aspects of the water industry should be privatised. Typically, the proponents of privatisation fail to recognise the 'tendency of natural monopoly' in the case of water supply and drainage and the other principal market externalities involved.

The situation that has developed in Thanh Trì is effectively a privately-owned waste treatment 'system'. The now de-cooperatised aquaculturists of the district are providing a vital waste management service to the city. In return for this informal service, the aquaculturists benefit from the increased nutrient levels in the water. The real net value added to the production of fish is, for a number of reasons, difficult to determine, but the farmers and the district government are adamant that they do not want to lose the benefits of the wastewater. If control of the resource is deemed 'profitable', as appears to be the case, then at least one incentive for private ownership of the 'system' exists. The real costs of running the system would need to be factored into any calculation.

The issue of continuing access to the wastewater by the farmers depends on the Hanoi Drainage Company who will, presumably, continue to 'own' the effluent, perhaps with

joint venture partners. The farmers will continue to provide the demand. How this relationship will develop will largely depend on the 'rent seeking behaviour' of the company. The economic value of the effluent will remain critical for the sustainability of the current economic environment. As long as the effluent has a measurable economic value, the institution responsible for it, presently the Hanoi Drainage Company, can sell rights to utilise the water for aqua/agriculture purposes assuming the price is not higher than that which can be absorbed by the aquaculturists. If the supply of wastewater were cut by an upstream treatment plant, the household survey found that a majority (36 out of 54) farmers would add chemical fertiliser to the pond water in order to replicate the nutrient benefit they currently receive from the wastewater if this were possible. They were not asked if this was an economically sound option. The aquaculturists' solution of adding chemical fertiliser would significantly weaken the ecological efficiency of the system. The aquaculture industry could become unsustainable. This response shows that farmers are more concerned about maintaining the economic benefits of the system despite the health impacts. The aquaculture system was first created to provide an economic benefit and continues to although now at an increasing cost to the health of the farmers and aquaculture workers. They nevertheless clearly have little choice given the current level of economic development.

6.6.4. Economic Rationalism, *Đổi Mới* and the Thanh Trì Case Study

A number of aspects of the theory behind privatisation are relevant to the potential sustainability of a Thanh Trì/Hanoi wastewater relationship. The economic rationalism through privatisation has been accelerating throughout the world in both industrialised countries and LDC's. In Australia, for example, the debate continues over the benefits of privatising public utilities, which is currently part of a national government policy. This

policy trend has developed regardless of the ideology of the respective governments and it reflects the enormous pressure of the global trend of economic rationalism.

The potential weaknesses of market based economics to satisfactorily deal with the issue of providing a sustainable option are evident. What is central to this case is that the water is not only for irrigation, and is at least as valuable as irrigation water anywhere, but that it is also nutrient rich and therefore further improves productivity. Currently, the wastewater is untreated and it therefore has had no value added to it deliberately. If a water treatment system is built, the owner of the effluent may consider that they are adding value to the effluent by reducing 'pollution', but in this case the action would destroy a resource.

The provision of public services such as drainage, is a problem for free market economists because of the 'free rider phenomenon', where not all consumers are forced to pay for a service and can, therefore, get a 'free ride' on those who do pay[28]. This is an example of market failure in these cases. The case of sewage or drainage is a classic case of potential market failure via the free rider problem. There is no economic incentive for a private company to provide or maintain the drainage system in Hanoi, unless contracted by the government.[29] At the moment in Vietnam, liquid waste disposal is effectively free as there is no economic incentive not to pollute the waterways. This situation applies equally to local, as well as foreign enterprises. Any law which enforces water quality standards above what can be achieved without expensive on site treatment, will probably affect those enterprises with the least capital support, which would tend to be the local investors.

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[28]The Free rider phenomenon refers to the ability for some to use a service without paying.

[29]This is a common solution, however the ultimate liability and risk rests with the government.

The capital cost of a fully reticulated drainage system would be enormous and the company would have no way of billing the consumer of the service. Everyone could potentially get a free 'drainage' ride. Likewise, the sewage system, in its current poor state, is a net cost to the service provider because only a highly structured and fully reticulated sewage system can be metered and a user pays system instituted. The social justice and public utility aspect of user pays sewage is an area of deep emotional, rather than economic or even ideological, argument. Sewerage disposal is, after all, an issue of public health and therefore, historically, one provided by the State.

The potential for private joint venture development of Hanoi's waste treatment system is conceivable, if not likely, given the trends globally. The managers of solid waste disposal, the Hanoi Solid Waste Company, have already unsuccessfully attempted a degree of commercialisation, at least in terms of a cross subsidisation.[30] This experience has at least demonstrated the economic power of the informal sector. The wastewater stream is more 'controllable' in the sense that it is contained within the drainage system, and is therefore less open to informal utilisation compared to the solid waste stream. It follows that wastewater has a more manageable commercial potential. At least one private foreign company has already explored the commercial possibilities of exploiting the nutrient resource of the wastewater.[31] The best commercial potential for foreign investment would involve the production of fish species that are suitable for an export market. If this occurs,

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[30]Recently the UNEP pilot Composting and Recycling Centre has taken a proportion of the solid waste stream. The cross subsidisation process was to be based on the commercial sale of the recyclable material that would be collected from the waste stream. The UNEP overlooked the fact that while the refuse lies waiting for collection it is thoroughly picked over by the 'informals' who take any material of any value, however seemingly small. The composting side of the UNEP pilot program has been slightly more successful but the additional transport costs attached to the redistribution of the compost makes the system inefficient.

[31]A company based in Melbourne called Zootech Pty Ltd has developed a number of commercial applications for lagoon based waste treatment, including aquaculture. They have two systems operating in Guangzhou and have made preliminary inquiries in Vietnam.

the potential for Very Sustainable nutrient cycling will be lost. Nutrients, part of the natural capital of a country, continue to move from poorer to richer countries. Nutrient 'flight' is part of the net flow of wealth from the South to the North. The only environmental benefit of such a development would be that the industry would require only 'useful' inputs into the sewage treatment system and would therefore mitigate against toxic pollutants. In this way, the downstream ecosystems would be better protected, but not for their intrinsic value, but rather as an inadvertent effect of risk minimisation by the investors in the aquaculture industry.

As part of the reforms of *Đổi Mới*, the public sector in Vietnam will be progressively affected by the process of privatisation. Dr. Vũ Tuấn Anh (1992) suggests that the State will decide which areas of the economy should remain under state control, and considers electricity, coal, cement, railways, civil aviation as the 'necessities of life', that should remain under state control. The potential for water supply in Vietnam to be privatised exists, and given the global trend, it is quite possible.

The potential for private control begs the question: Under what conditions would the 'ownership' of the water industry in Hanoi be profitable?
The following issues will directly affect profitability:

1. Drainage, which is impossible to meter, and as a result, problematic to charge for. The market failure of the 'free-rider' phenomenon is likely, therefore the state, or, in this case, the Provincial People's Committee is the only identifiable client.

2. The investment requirements for infrastructure development are beyond the current budget for such capital works in Hanoi, although a low tech option such as a Mai/VAC model would be the most economical solution.

3. The establishment of a sound (commercially not philosophically) regulatory framework that prohibited (enforceable) unauthorised use of the wastewater would be required. Such regulation has a poor compliance record in Hanoi. For instance, there continues to be illegal tapping of the water mains and illegal building of houses and extensions.[32]

6.6.5. Management of the Ponds

The land reforms that have created a change in the political economy elsewhere have been more problematic in Thanh Trì, where the size of the ponds and the special management problems specific to large scale aquaculture have prevented a wholesale return to household-based agricultural production.[33] Management of the ponds demands the continued existence of cooperative structures. Of the 56 households involved in aquaculture that were surveyed, 49 are involved in a cooperative arrangement to produce fish. Of the remainder, 4 are sole household producers and 3 are involved with the coop and also produce privately. The household survey found a degree of dissatisfaction with the collective management of the ponds. The household survey in Thanh Trì, for example, identified that many farmers were concerned with the current management of the ponds, suggesting that they would prefer to have family rather than collective control. Despite the obvious difficulties of physically dividing the ponds, the survey found that 8 households were not satisfied with the current system of management. Some of these respondents commented that they would prefer a system of divided ponds. The majority of those surveyed (45) were satisfied, however, a few suggested that the ponds should be sold to the aquaculturists, or at least divided between families 'to concentrate resources for maximum productivity'.

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[32]Fforde makes the point that rapid privatisation is testing the regulatory strength of the State Apparatus (Fforde 1993).

[33]With particular relevance to this case study is the land reform measures to allow farming families to lease an area of land for 15 years, and importantly to have total management of that land.

The nature of the pond system does lend itself to such divisions, although the process has been implemented and families have their own plots. An important 'ownership' issue is that of equipment and tools. In Vietnam generally, the experience has been that collectively owned equipment was not well cared for. Tools went unrepaired and communal animals were overworked and underfed. Indeed, Tria Kerkvliet (1995: 403) believes the local expression *cha chung không ai khóc,* or 'no one mourns for the father of everyone' is an explanation of this phenomena. In other words, users of the commonly-owned tools have taken less care of them than tools 'owned' by the family. The household survey of the aquaculturists identified a strong desire for tools and equipment to be in the control of individual families, which is consistent with the desire for greater individual/familial control.

One farmer surveyed in Trấn Phú suggested that 'the managers should make a clear statement about the area of the lake which [is] controlled [by] each family'. In the case of one 10 ha pond in the Thịnh Liệt area, some of the farmers have insufficient finance to pay rent so they have formed a group or an 'agreement cooperative', not a government organised cooperative. These are 'groups of people working at the same level and the same effort, the same agreement, and the freedom to make their own arrangements' (Mai Đình Yên 1992: 4). One farmer in Yên Sở suggests that the ponds should be used all year instead of the current system of draining them during the winter and growing rice. If this were the case, a species of fish more tolerant to cold weather would need to be found. One of the wealthier households in Yên Sở suggested that the ponds should be divided into smaller ones with an area of about 3-4 ha for easier maintenance and control.

For the system in northern Thanh Trì to be ecologically and economically viable in a market-based system, the products must be valued. To this end, the degree to which the

fish may be contaminated by pollutants from Hanoi will be of increasing concern as the perception of risk develops. The wastewater system must be protected from all toxic and undesirable pollution by the application of 'clean technology'. In Thanh Trì the 'risk' of health impacts from utilising the sewage is secondary to the 'risk' of poverty from reduced productivity associated with not using the wastewater.

6.7 Conclusion

In this chapter a description of the relevant physical and historical characteristics of the case of wastewater re-use in the district of Thanh Trì has been presented. It has shown that while the surface water quality in the lakes, ponds and drains of Hanoi is very low in many water quality parameters, the use of the organic material as fertiliser is of enormous benefit to the growth rates of fish, rice and some vegetables and therefore the local economy in the northern region of the district. The toxins that are evident in the surface waters must be addressed but, ideally, not at the expense of the beneficial nutrients. It is recommended that the application of economically achievable clean technology with on-site treatment would correct the problem, although the issue of who pays remains.

In this chapter it has been shown that the barriers to and the opportunities for the implementation of a more sustainable model of urban/rural food production, wastewater re-use and sewage treatment, fall under a number of categories. There are issues of risk in terms of the impact on human health of utilising wastewater, and there is the opportunity of continuing to apply a technology that already exists and indeed this should be developed into a 'model' SD solution.

The technology of wastewater re-use is well developed in the district of Thanh Trì. The system contains many features of rural development which is potentially very sustainable. However, there are several weaknesses that must be rectified. These include the current

and potential health impact on the human and non-human population in the district. The health impact from the shortfall in sanitation can be corrected by improving the quality and quantity of the water supply, and by continuing the public education programs already being implemented in the district, to discourage contact with the wastewater. The occupational health of the aquaculture workers can be addressed by the use of waders, boats and other simple devices that minimise the physical contact between the workers and the water. The eradication of intestinal parasites requires a more comprehensive program than was in evidence during the study period. The ad hoc provision of worm medication is not the best solution, rather the point of infection must be sterilised. A number of possible reasons for continuing parasitic infections in children was evident and these must be addressed on a case by case basis. One of the barriers to the application and expansion of the technology of wastewater re-use is the negative vision created by the inappropriate association which ill-informed policy formulators make between a local chronic parasite problem and the near-by utilisation of wastewater. The two phenomena are more than likely to be unrelated.

Chapter Seven

Conclusion

7.1 Introduction

In this chapter, the discussion in chapters four, five and six is drawn upon to conclude the research questions outlined in chapter One which address the following issues. Firstly, the emerging political dimension of the transitionary phase and the possible impact this may have on the growth of environmentalism. Secondly, the impact the increasingly unregulated market under the economic reform policy of *Đổi Mới* may have on prospects for SD sustainable agricultural development techniques such as VAC and the Mai Đình Yên model. Thirdly, the issues of whether the current policy, the policy formulating structure, and the importation of environmental policy ideas, provide barriers to, or opportunities for, a more sustainable development pattern in Vietnam

7.2 Politics and Participation

The issue of political transformation has been addressed in terms of aspects of the radical model of anarchic development and its application to the Vietnamese situation. The tradition of local control and the evidence of a resurgence of this tradition is promising in terms of SD models. Invariably, local communities will choose a sound environmental path if they are part of the impact assessment and their health and welfare are not treated as economic externalities. According to the human ecological view, local communities must be in control of their local resources and responsible for their own pollution, in order to make the appropriate decisions. The current political ideology and policy formulating structures in Vietnam are a barrier to a more sustainable development pattern because central authority is perpetuated and reinforced.

The examples considered in chapter Four of an embryonic environment movement in Vietnam have some similarities with the environment movement in Eastern Europe in the late 1980s and early 1990s, in as much as their credibility and, therefore, their profile followed from an eminent core membership. The scientists involved in the environmental movements in Eastern Europe and Vietnam have taken advantage of the general perception that science is value free and therefore of no significant political threat. The environmental protest experience in the former socialist states of the Soviet Union and Eastern Europe contributes to an understanding of the situation in Vietnam because it demonstrates that regardless of the political system local communities will react when their health is threatened. The protest experience in the former socialist countries also shows that the state will attempt to 'capture' dissent and integrate it back into the state. The experience in Eastern Europe shows that when environmentalism moves from minor conservation issues to a critique of central political authority, the state environmental institutions lose legitimacy and oppositional forces replace them.

7.3 Sustainable Development and *Đổi Mới*

Many traditional sustainable practices in Vietnam will be lost because a form of technological determinism drives decision makers, and those who influence them, toward technological and engineered solutions rather than giving full consideration to alternative 'low tech' solutions. Two of the institutional barriers to these alternative views being recognised are a lack of interdisciplinary understanding and negligible interagency cooperation. These are common limitations in governance throughout the world and both are very evident in Vietnam. While radical change could arguably create the most sustainable conditions, incremental reform is likely to continue to be the key feature of Vietnamese sustainable development despite the weakness of incrementalism in terms of environmental policy.

As discussed in chapter Two this thesis supports the view, held by the social-ecologists, that the most sustainable forms of development come from grassroots, small scale, local initiatives and, as such, have little to do with government environment policy. This raises the question of whether there is any theoretical potential in Vietnam for unregulated environmentally sound development, given that some aspects of Vietnamese society, such as traditional culture and religion, do not appear to need any regulation by the state. Therefore there exists a strong and fundamental cultural pre-condition for the development of anarchic, small scale sustainable food production in Vietnam.

The land reform that occurred in Vietnam has contributed positively to both agricultural productivity and prospects for sustainability. For example, as the availability of land is limited to family size units, each will need to maximise the productivity from their plots. On the one hand, if the VAC system of whole farm management is fully extended and the long term economic viability of the system recognised, then an objective of sustainable pollution free agricultural production can be achieved. If, on the other hand, the government, at whatever level, allows the concentration of land under single managers or companies, there is a danger of monocultural production with heavy chemical dependence appearing as the most commercially viable option. The anarchic model of agricultural development is particularly relevant because control of the technology is more important than the technology itself. The land ownership/control issue is as critical in Vietnam as it is to unsustainable farming practices anywhere in the world.

The political economy of the dominant agricultural paradigm tends to favour a certain form of production and institutional framework which includes the vested interests of agencies such as the government departments concerned with agriculture and the agrochemical industry. These agencies do not favour the integrated, less dependent systems, because these methods, such as permaculture and VAC, tend to erode the power of government

agencies and the profitability of the agricultural chemical industry. These environmentally sound development options are, therefore, not given the same support as the mainstream methods.

Đổi Mới will affect prospects for sustainable development in a number of ways. A fundamental change has occurred in the Vietnamese economic system. The environment is now 'valued', or 'undervalued', in the same way it is in other market-based economies. The ability of the market-based economics to value environmental goods and services is very contentious and no economic system, established or transitional, has a comprehensive and ecologically sound methodology in place. The continuation of *Đổi Mới* is likely to replicate the failures of the market to protect and enhance environmental integrity elsewhere. There is a relatively low level of understanding of environmental economics currently in Vietnam and this is one of the weaknesses of the transitional phase. *Đổi Mới* appears to have reduced the level of responsibility of authorities over the planning of agricultural production. This is appropriate for family-based VAC systems but is less appropriate for large aquaculture systems utilising wastewater, as in Thanh Trì, where total catchment management in terms of reducing pollution is important.

7.4 Wastewater Re-use

The agricultural development model of VAC will, if fully implemented, contribute significantly to Vietnam's opportunities for a more sustainable development. The combination of the principles of the VAC model and an extension of the aquaculture system in Thanh Trì, suggested by the Mai Đình Yên model, would represent sustainable development of the highest order. The perception by Vietnamese policy makers that Vietnam is 'behind' the rest of the world is pervasive and unhelpful in terms of low technology solutions. Instead, should Vietnamese technocrats decide to maximise the opportunities for sustainable development they may wish to consider that techniques which

already exist in Vietnam, such as VAC and the productive use of wastewater, is 'in front', and should be held up as a sophisticated SD example to the rest of the world.

7.5 Environmental Strategies

The nature of policy development and implementation in Vietnam has inherent limitations in terms of the prospects for enhanced SD. The fundamental limitation is the failure of Vietnamese policy makers to recognise the causes of the ecological crisis and therefore weaknesses of the SD policy they have developed. The policy that has been adopted is borrowed heavily from countries whose cultural, economic, regulatory and environmental circumstances are quite different. Furthermore, it is corrective, rather than preventative, in its approach. The NPESD will fail to achieve SD in Vietnam, although what implementation will occur may slow the rate of degradation. Policy formulation and implementation is limited by the lack of training in environmental management and particularly in interdisciplinary skills.

The concept of decentralisation is consistent with a number of SD views, although the anarchic model of local control is best represented by examples in Vietnam of direct grass-roots control of the environment. The case of the fish farmers negotiating with the textile factory SOE manager is one example. Another aspect of this notion in Vietnam is evident in activities such as the unregulated exchange of hoarded materials between SOE's or cooperatives. In theory, the control of resources and energy at a local level can lead to greater sustainability because reduced transport leads to reduced energy consumption. In addition nutrients are not 'exported' to other areas but are cycled more efficiently in a particular area. Vietnam is pursuing a development path that will increase its participation in the global economy which will, in turn, limit the potential opportunities for local resource control, consumption and nutrient recycling and, therefore, ecological sustainability. Nevertheless, ecologically efficient production orientated to export, although more energy

intensive, at least makes sustainable use of the available nutrients, than might otherwise be the case. The establishment of provincial level environment authorities is an example of state controlled decentralisation and, while it may put decision makers closer to the environmental conditions in their respective areas, it has not significantly reduced the control of state authorities that is required within an anarchic development model.

Although some have argued that a strong state can, with appropriate environmental values, achieve the goals of sustainable development, this is unlikely to occur in Vietnam. The environmental strategy in place is weak and largely unimplementable. Likewise, the proliferation of the market will not support SD outcomes because of various market failures. The most significant opportunity will be the resurgence of community based development, which focuses on the production needs of the community, and the local environments ability to provide resources and absorb pollution. It is argued that despite the impression of strength, the Vietnamese state is weak in critical ways that affect the direction of policy. The state is open to outside influences that contradict the Party's ideological direction.

7.6. Outcomes

A number of outcomes have resulted from this thesis. For example, the relationship between the development of Vietnam's environment policy and its current economic strategy is better understood. The applicability of models of ecological sustainability have been explored. Some of the barriers to the adoption of an integrated environmental and economic policy have been identified. Some of the influences, both internal and external, on Vietnam's environmental perception and orientation have been identified.

Among the principal barriers to SD in Vietnam are; a low level of environmental understanding amongst technocrats, polluting industrial technologies, incomplete

environmental policy and non-observance of environmental regulation. A further barrier to low technology solutions is perception, both within and outside Vietnam, that local technology is 'backward'. When such attitudes predominate it is very difficult to re-establish the credibility of traditional or apparently low tech solutions to problems of agricultural production or wastewater treatment even though such solutions are finding new favour in the West. Although there is a low level of integrated SD knowledge among the technocracy this cannot be said of the peasant farmers. Unfortunately given the top-down nature of information transfer in Vietnam technocrats have little way of assessing the real level of knowledge at a grassroots level.

One of the central questions of this thesis is whether the development and implementation of policy in Vietnam will enhance or reduce the prospects for more sustainable development. The NPESD, and the institutional structures being built to implement it, have 'captured' the notion of SD but not the need for revolutionary change necessary to achieve a sustainable outcome.

It is ironic that in Vietnam, because economic conditions are poor and pressure on land use is high, the use of 'nature strips', roadside and railway easements for vegetable production is very common. If such developments were to occur in the West they would be evidence of a paradigm shift toward more efficient forms of low environmental impact food production. Where these practices already exist in the so-called 'developing' world these practices are described in the mainstream development literature as 'backward'. Therefore, part of the purpose of this study has been to investigate the re-use of urban wastewater for food production within the peri-urban region of Hanoi as an example of sophisticated, not backward, sustainable development. On the face of it, the use of wastewater in this way is consistent with the most advanced thinking on environmentally friendly water treatment and organic farming, however the case of wastewater re-use in Thanh Trì has not been

used internationally as an ideal example of sustainable development. In this thesis how 'ideal' the case of wastewater re-use in Thanh Trì is, and what barriers exist that limit the sustainability of the situation have been considered. This thesis has assumed that Vietnam has an enormous opportunity to develop in ways that are likely to be an example to the West rather than, as many in Vietnam and the West assume, the current Western model of both technology and policy being the example to Vietnam.

7.7. Further Research

The potential impact of polluted water on the population of Thanh Trì must be explored for the sake of the health of that community.

The government's attitude to the issue of privatisation of the water industry is, at best, ambiguous, therefore research on the potential impact on the health and livelihoods of the aquaculture industry in Thanh Trì of potential changes to the wastewater treatment regime should be further explored.

The potential for a large scale VAC model solution as proposed by Professor Mai Đình Yên, must be examined and requires the attention of authorities committed to an SD outcome.

Appendix A

Record of interviewees

The following list contains the names of those who were interviewed in Vietnam, and therefore provided data for this case study. Most of the those named provided formal recorded interviews. Others became acquaintances and more informal 'informants' and mentors. In terms of qualitative research it is to many of these people that the greatest debt is owed.

Name	Position
Đinh Xuân Hùng	Information Officer Ministry of Science, Technology and Environment
Prof. Mai Đình Yên	Professor Biology Department, University of Hanoi
Phan Quỳnh Như	Manager Hanoi Environment Committee and Manager of Hanoi Association for Conservation of Nature and Environment
Dr. Nguyễn Huy Nga	Permanent Secretary for the National Sanitation Program
Prof. Đang Như Toan	Dept. of Environmental Economics and Management, Hanoi National University of Economics
Đỗ Ngọc Hoàng	Head of the Technical Section of Hanoi Sewage and Drainage Company
Dương Thị Vịn	Vice President of the Hanoi Women's Union

Lê Quí An	Vice President - State Committee for Science President - Vietnam Association for Conservation of Nature and Environment
Nghiêm Xuân Đạt	Director General - Hanoi Urban Environmental Company
Prof. Ngô Đức Thịnh	Vice Director - Institute of Folklore
Prof. Nguyễn Quang Thai	Hanoi National Economics University
Nguyễn Khac Kinh	State Committee for Sciences Dept of Natural Resources and Environment
Dr. Khuc Xuyen	National Institute of Occupation Health
Trần Thư Lan	Deputy Head of R&D at the National Information and Documentation Centre[1] for Science and Technology
Dr. Nguyễn Việt Thịnh	Head of Dept., Social and Economic Geography, National Pedagogic University
Le Thi Khánh Vân	Centre of Technology Transfer, State Committee for Science
Nguyễn Ngọc Sinh	Dept of Environmental Protection, State Committee for Science
Dr. Hoàng Định Hoi	Director of the National Sanitation Program, Ministry of Health.

[1]Like Institutes which are attached to ministries and do research in order to brief their respective ministries, Centres are also attached to ministries but are smaller and tend to be more focussed, eg. one institute may have a number of centres

Dr. Nguyễn Đac Hy	State Committee for Science, Dept. of Natural Resources and Environment
Trần Thi Vân Anh	Head of Dept. of Women and Labour, Centre of Woman's Studies, National Centre for Social Science
Bùi Tâm Trung	President of the Hanoi Association for Conservation and the Environment, and Vice President of the Hanoi Environment Committee
Prof. Phạm Xuân Nam	Vice President National Centre for Social Sciences & Editor-in-Chief of "Vietnam-Social Sciences"(in English)
Trần Yem	CRES, member of EIA & WQM Group
Võ Qúy	Former director and co-founder, CRES, founding member of Vietnam Conservation Association, Institute for Ecological Economy, various International organisations.
Prof. Nguyễn Văn Trương	Director of the Institute for Ecological Economy and Vice Chairperson Vietnam Resources and Environment Association
Vũ Thi Yên	International Cooperation Dept. National Centre for Social Sciences
Dr. Lâm Minh Triết	Director of Research and Training Centre for Water Supply and Sanitation HCMC Polytechnic
Dr. Vũ Tuấn Anh	Director Institute of Economics, National Centre for Social Sciences

Đặng Đương Bình	Chief Inspector Hanoi Environment Inspection Service
Prof. Đặng Nhu Toan	Dept. of Environmental Economics and Management National Economics University
Prof. Đao The Tuấn	Director Vietnam Agricultural Science Institute
Prof. Phạm Ngọc Đang	Director of the Centre of Environmental Engineering of Towns and Industrial Areas. , Hanoi College of Civil Engineering
Prof. Trương Tùng	Vice Chairperson People's Committee Hanoi City
Dr. Phạm Bich San	Deputy Director Institute of Sociology, Head of the Social Demographic Section
Prof. Trần Ngọc Chan	Head of the Environment Dept. The Centre for environmental Engineering of Towns and Industrial Areas, Hanoi College of Construction
World Bank Peter Stephen	External Affairs Officer, East Asia and Pacific Region, World Bank
World Bank M. Bieberstein Koch-Weser	Division Chief, Environment and Natural Resources Division Asia Technical Department
International Union for Conservation and Nature Victoria Heymell	Project Coordinator- Vietnam
Walden Bello	Director Food First, Institute for Food and Development Policy

Prof. To Linh	Office of the Council Of Ministers, Senior adviser to the Minister for Sc. Tech and Env.
Prof. Nguyễn Quang My	Soil Form Erosion Laboratory, Faculty of Geography, University of Hanoi
Prof Nguyễn Hoan	Vice Dean Faculty of Geography, University of Hanoi
Prof. Lê Văn Trung	Director National Institute of Occupational and Environmental Health
Nguyễn Thanh Bình	Tropical Centre Laboratory
Assoc. Prof. Dr. Nguyễn Trong Chuan	Director of Institute of Philosophy, NCSS
Assoc. Prof. Dr. Trần Trong Huu	Director of Planning and General Affairs, NCSS
Dr. Hoàng The Lien	Deputy Director' Institute of State and Law, NCSS
Dr. Nguyễn Tien Loc	Professor in charge of the establishment of a department of Environmental Economics, National University of Economics
Dr. Le Dien Duc	Coordinator, Waterbird and Wetland Working Group Biology Faculty, Hanoi University

Appendix B

10.1 Is the fishfarming you do household cooperative or both? / Ông (bà) nuôi thả cá theo gia dình, hợp dồng cho hợp tạc xã hay cả hai?

10.2 If for contract what inputs does your household provide? / Nếu là hợp dồng thì gia dình phải dóng góp gì?

10.3 How many members of your household provide labour for aquaculture? / Số lao dộng của gia dình tham gia vào nuôi thả cá?

10.4 Do you receive information on fish farming? If yes from whom have you received information? / Ông(bà) có nhận dược thông tin(chỉ dẫn) gì về nuôi thả cá?

10.5 What type of information have you received? / Gia Dình nhận dược thông tin dưới dạng nào?

10.6 Has this information helped you produce a bigger crop? / Thông tin này có giúp gia dình thu hoạch dược nhiều sản phẩm hơn không?

10.7 Are there any aspects of fish farming that you require futher information? / Gia dình có cần thêm thông tin về khìa cạnh nào trong nuôi thả cá nữa không?

10.8 Is there any equipment that would assist you in fish production? / Có dụng cụ nào có thể giúp gia dình trong sản xuất?

11.1 What has been the household income over the past twelve months / Trong 12 tháng vừa rồi thu nhập của gia dình như thế nào?

11.2 How has your income changed since 1988? / Từ năm 1988 đến nay, thu nhập của gia dình có thay dổi gì không?

11.3 Did any members of your household work in a non agricultural job? If so what? / Có người nào trong gia dình ông(bà) làm phi nông nghiệp không?

11.4 Does the household have any other sources of income? / Gia dình có nguồn thu nhập nào khác không?

13.1 Have any members of your household suffered any kind of sickness in the last two months ?-describe / Có người nào trong gia dình bị bất cứ một bệnh gì trong hai tháng vừa qua không?

13.2 Does any member of your household get sore skin or eyes after working in the ponds? / Có ai trong gia dình mắc bệnh dau mắt sau khi làm việc dưới ao không?

13.3 If yes, how long does the condition last and what % of the body is affected? / Nếu có, tình trạng này kéo dài trong bao lâu? Mức dộ cơ thể bị mẩn ngứa, lở loét là bao không

13.4 Does this condition bother you? / Tình trạng này có lànm ông (bà) lo lắng không?

13.5 Do have any concerns about working with the waste water? / Ông (Bà) có diều gì bận tâm về làm việc trong nguồn nước thải không?

13.6 Please list the concerns you have? / Nếu có, diều gì làm ông(bà) quan tâm?

13.7 Are there any alternative techniques you and your family could use to avoid contact with the waste water? / Để tránh tiếp xúc(trực tiếp) với nước thải, ông(bà) hoặc gia dình có thể sử dụng kỹ thuật hoặc phương tiện (cải tiếp) giầ Cho ví dụ:

14.1 What method do you use to recognise the concentration of the waste water? / Ống(bà) sử dụng phương nào để nhận biết nồng của nước thải?

14.2 Have you noticed any unusual colours in the waste water? / Ông(bà) có nhận thấy màu sắc khác thường nào trong nước thải không?

14.3 Have you noticed any unusual developments in your fish stock? / Ông(bà) có nhận thấy sự phát triển không bình thường nào trong ao hồ thả cá không?

14.4 What information do you want to know about the waste water? / Ông(bà) cần biết nhữnh thông tin gì về nước thải?

14.5 If the waste water from Hanoi was treated before it entered Thanh Tri it would not fertilise the ponds as much and fish production may go down. If this occurred how would you compensate? / Nếu nước thải Hà Nội được xử lý trước khi chảy vào Thanh Trì nó sẻ không giàu chất dinh dưỡng như trước, do đó sản lượng cá thể sẽ giảm. Khi đó, ông(bà) sẽ giải quyết bằng cách nào? Cho ví dụ:

14.6 Are you satisfied with the current method of managing the ponds? If no please suggest improvements./ Ông(bà) có cảm thấy hài lòng về cách quản lý ao hồ heận nay không?

The following part of the survey is for women only/ PHẦN DÀNH RIÊNG CHO PHỤ NỮ

15.0 Work / Công việc

15.1 Where do you work, please indicate the approximate number of hours per day you spend in each area./ Bà làm việc ở đâu? Loại công việc va số giờ trung bình/ngày
NB: Only those who worked in the ponds were included

15.2 Other duties
Type of duty and approx. time spent / Các nhiệm vụ khác, tên công việc va số giờ trung bình/ngày *

15.3 Do you get additional income from a left hand job? Please specify the income generating activity./ Nghề phụ/Nghề tay trái
Bà có thu nhập thêm từ các nguồn sau đây không?

16.1 Do you suffer from any long term health problems Describe / Bà có bị bệnh kinh niên nào không ?

16.2 Have you had any rashes or sores on your skin that take a long time to heal? If yes please. / Bà có bị bệnh phát ban hoặc lở loét ngoài da phải chữa trị trong thời gian dài không?

16.3 Do you get sore eyes, If yes for how long and how do you treat the condition? Where were you working when you got the condition?

16.4 Have you had any vaginal infections, if yes, for how long did the infection last, how did you treat the condition and where were you working when you contracted the condition?

16.5 Do you get headaches? If yes, how often and why do you think you get the condition?

16.6 Has it been difficult for you to have children? If so have you suffered a miscarriage, if so what was the reason?

17.1 Do you have children? If yes how many, and what is the age range.

17.2 Have any of your children had itchy skin, chronic skin infections and/or sore eyes?

17.3 Do any of your children swim, wash in the pond, lake or river?

17.4 Have any of your children suffered any chronic illness or conditions?

17.5 Have your children experienced any learning difficulties?

17.6 Các con ủa bà có ai bị giun, sán không ?
If yes, Nếu cò, dã diêu trị như thế nào ? Xin nêu cụ thế.

Appendix C

General Water Quality Data in Hanoi Rivers

The temperature varies between 22-27°C

Suspended solid vary between 100-300 mg per litre

The BOD5 (Biological Oxygen demand over five days) 50-100 mg/l

The COD (Chemical Oxygen Demand) 90-495 mg/l.

Table 1: The Chemical Composition of Hanoi's Wastewater from six sites.

Parameters	Unit	Trần Bình Trong	Ba Trieu	Trinh Hoai Duc	Phan Dinh Phung	Kim Lien	Trung Tu
Flow Rate	m^3/day	1200	10000	-	-	3600	1000
Temp.	Centi-grade	17-22	17-23	16-22	17-22	17-23	17-22
Suspended Matters	mg/l	120-200	200-270	150-180	120-180	240-300	100-120
pH		7.1	7.3	7.5	7.2	7.7	7.2
Sediment	mg/l	450	450-480			520	400
Dissolved oxygen		0.5-1	0.3-0.5	0.5-1	0.5-1	0.1-0.5	0.5-0.6
Oxidisation of $KMnO_4$		51	25	40-50	25	60-65	50-55
BOD5 (NOS5)		75	80-110	50-60	75-95	100-150	35-40
COD (NOH)		190	110	150	90	290	160-170
Total N_2		45	40	36	40	45	40-43
NH_4		15.8	12-24	20	35	40	25-26
NO_2		0	0.3	cv	1.2	cv	1
Cl				60-70	10-113		90-93

Source: Workshop on Chemistry and Environmental Protection. Vietnam Society of Chemistry, Hanoi, October 1990. Authors Nhuệ, T.H., Tien, D.D., Nguyen, V.T.

Sample from the Tô Lịch and the Nhuệ rivers revealed pollutant parameters 5-20 times the average for the urban ponds and lakes.

It is expected that when the Vinh Tuy industrial area, in Hanoi, is fully developed and discharges to the Nhuệ River are not pre-treated, BOD will rise from a current maximum of 115 mg/l to 209.7 mg/l. The generally accepted minimum DO for fish culture is 5 mg/l.

The Tô Lịch is in slightly better condition due to a larger catchment and slower discharge rates, hence a greater dilution of organic pollutants occurs. The To Lich BOD 5 is less than the Kim Ngưu, however at certain points, Cau Moi and Kim Giảng, the impact of the Thuong Dinh industrial area pushes the BOD 5 values to 547-570 mg/l and H_2S at the latter site of 29.75 mg/l.

Table 2: Soil Contamination Levels in Thanh Trì

Metal	Văn Điển soil Readings
Cu	12.85-49.69 ppm
Mn	172.78-2017.05 ppm
Zn	25.13-243.47 ppm
Pb	17.44-62.47 ppm

Source: Pham Undated

The water quality parameters that have been tested are limited in both frequency of sampling and the number of chemicals tested. This severely limits the usefulness of the results.

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