PROTECTING THE WATER COMMONS IN VIETNAM'S CRAFT VILLAGES

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ABSTRACT

Vietnam's craft villages contain many family-based workshops that specialize in 'traditional' handicrafts as well as newer commodities such as recycled products. The economic benefits brought by recent and rapid growth in the number and size of craft villages are, however, diminished by water pollution and risks to health, agriculture, and other livelihood activities. The government treats water pollution as an externality to be managed through direct regulations, market-based instruments, public education or self-regulation. However such mechanisms have proved ineffective given the economic significance of crafts in for rural livelihoods. This paper presents research in the Red River Delta of Vietnam on the drivers of reduced water quality in this craft village region. By considering water quality as a "complex commons", we identify key actors at different levels of social organisation that need to be involved in finding solutions to this water quality crisis. The research highlights the political, economic and social drivers of pollution, and the importance of relationships between actors at multiple sites, sectors (e.g. state, resource users and civil society) and at different scales (e.g. local, regional, and national) in pollution and its management.

Keywords: water, pollution, craft village, small and medium enterprises (SME), peasant, Vietnam

1. INTRODUCTION

Vietnam's phenomenal economic growth, led primarily by an expanding manufacturing sector, has come at the significant cost of environmental pollution (World Bank 2008). Pollution has been framed both as a scar on Vietnam's prospects for sustainable development (ibid.), and as a motivator of civil society action against large polluting firms and an ineffective or disinterested state (O'Rourke 2004 a and b).

In Vietnam's environment and development story, the situation of its craft villages – central to the Government's rural industrialisation policy – is relatively unexamined (World Bank 2008). Specialising in the production of 'traditional' crafts such as agro-food processing, textiles, ceramics, fine arts and furniture, as well as newer activities

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such as solid waste recycling, the number and size of craft villages has grown significantly with the shift from central planning to market-orientation brought by *Doi Moi* in 1986 (Dang and Nguyen 2005).

Like large scale industry, craft villages are an emerging focus of national and local environmental concern, with new laws and policies to match (MONRE 2008). However, the small and dispersed nature of craft enterprises makes them even more difficult to regulate than their large scale counterparts.

We argue that existing policy paradigms, which frame pollution as a technical problem or as an externality to be managed through market-based instruments, must be revisited in light of the circumstances and relationships found in craft villages. Drawing on recent work on the 'complex commons', as well as political ecology, we propose a framework that considers the social, economic and political conditions of craft village production within the wider political economy, interdependencies amongst various actors, and the opportunities and barriers to coordination and collective action.

This approach is applied to three case studies in the Red River Delta: Duong Noi, a textile village, Nha Xa, a silk village, and Phong Khe, a recycled paper village. The resulting analysis contributes new knowledge on social transformation in Vietnam's craft villages, where the livelihoods of peasant farmers have shifted from a mix of farming and craft production to more specialised craft production.

2. CRAFT VILLAGES AND POLLUTION: CONCEPTUAL ISSUES

Water pollution occurs when waste exceeds the absorptive capacity of a water body, whether from identifiable and monitorable *point sources*, or from diffuse *non-point sources* (Nguyen et al. 2006). However, the causes of this seemingly mechanical process are far more socially complex. While the pollution literature typically frames pollution as a market externality, we suggest that a richer analytical framework is needed to understand the root causes of pollution, drawing on commons theory and political ecology.

2.1 Pollution as negative externality

Ecological economics explains pollution as negative externality of poorly functioning markets. Watersheds are treated as a free good with no defined property rights (Tietenberg 2006), and therefore prone to overuse (Vatn 2005). In an efficient and sustainable market, such costs would be factored into the product price so that the consumer ultimately pays for the costs of cleaner production of the goods they demand (Tietenberg 2006).

The emphasis is then on finding an acceptable value for environmental and social costs (Tietenberg 2006); defining an appropriate role for institutions, in the sense of policies and regulations, in addressing imperfect markets (Vatn 2005); and limiting the transaction costs associated with such mechanisms. In the Vietnamese context, this approach has underpinned government attempts to introduce a price for pollution – both to large firms and smaller producers – in fees per unit of pollution emitted. State agencies not only lack the capacity to gather the data needed to set such fines, but also

the capacity to implement them, given their meagre resources, low pay, pervasive corruption, lack of leadership and weak coordination (O'Rourke 2004; Mcallister at al. 2010).

In the craft village context, it is important to examine the difference between larger point source pollution (PSP) and dispersed small-scale polluters. Are the processes and imperatives driving these small producers the same as larger firms, or is the situation akin to the non point-source pollution discussed by Sarkar et al. (2008a), with its associated complexity and coordination challenges?

2.2 Water quality as complex common pool resource

Although only recent discussed in this way, water quality demonstrates some classic qualities of common pool resources (CPRs, Sarkar et al. 2008a). Firstly, it has low excludability - multiple users cannot be easily excluded from appropriating water quality by polluting the water body. Secondly, water quality is subtractable – its reduction by one user reduces the quality of water available to other users (Dietz et al. 2002; Sarker et al. 2008b).

Through a common property lens, the the management challenge is primarily one of coordination through appropriate institutions (Dietz et al, 2002: 20). Such institutions can facilitate effective and coordinated collective arrangements within and between scales, thus addressing resource related conflicts (Ostrom 1992; McCay 2002; Berkes 2002). However the absence of effective institutions and governance can lead to non-cooperation among resource users and poor resource management (German et al 2010). We later discuss whether the conditions for cooperation and collective action exist in craft villages, given the existence of common or interdependent interests among craft producers.

Sarker et al. (2008b) suggest a need to better understand the interdependencies among resource users and between resource users and related CPRs in order to effectively govern a complex CPR such as water quality. Recent complex commons work also finds that, like water quality in a river system, many common pool resources are large, diffuse and cannot be managed through local organization alone (Ostrom 2009; Adger *et al.* 2006; Armitage 2008; Berkes 2008). Actors at various levels must be coordinated through networks and institutions that link local with higher levels of social and political organization (Berkes 2008).

Finally, McCay (2004: 393) points to the importance of understanding the characteristics and the situation of resource users: their situation, values, social networks, and perceptions of environmental problems, as well as the influence of local, regional, and global economic and political forces. Armitage (2008) adds that governance is not a technical but a political process, infused with power and knowledge differentials and with important distributive implications. He calls for analysis of the political economy of environmental management, which takes us next to the value of political ecology in examining craft village pollution.

2.3 Political ecology of water degradation

Political ecology scholarship aims to understand the inherently political nature of environmental processes and interventions, involving the negotiation of knowledge (Li 2007; Tsing 2008), processes of marginalisation (Vandergeest 2003; Ducourtieux et al. 2005) and acts of resistance (Peluso 1992). Questions of access and control over resources, and associated power relations, are examined to understand the causes of environmental degradation (Peet and Watts 2004: 6). Peet and Watts (2004) survey the breadth and diversity of this field beyond these common points of interest. Here, we focus on critical themes of relevance to understanding craft village pollution.

Pollution is coming under the lens of political ecology as a 'brown' environmental issue (Peet and Watts 2004), often understood as the remit of large firms locked in battle with civil society in (O'Rouke 2004, Forsyth 2004). The case studies examined in this paper will highlight, however, that a david-and-goliath representation, pitting civil society actors against industry, does not easily resonate in the craft village context where producers are neighbours and kin.

Instead, the small-scale nature of craft production is akin to the small-holder context studied by Blaikie and Brookfield (1987) in their seminal work on land degradation. They attributed land degradation to a range of pressures on resource-poor farmers, such as access only to marginal lands, livelihood imperatives, market opportunities, population pressure and surplus extraction by elites (ibid: 243). We consider it important to examine how social, economic and political relationships contribute to the creation of pollution, in a similar vein to this early land degradation research.

Like common property research, the institutional context – both in terms of the 'rules of the game' (rules-on-paper) and 'rules-in-use' are of interest in political ecology (Watts and Peet 2004). The situation of Vietnam's craft villages points to everyday flouting of state rules. Everyday acts of individual or groups of craft producers, who quietly evade, modify or resist the existing rules or regulations to make a living have previously contributed to the demise of collective farming in Vietnam (Kervkliet 2005, Dang 2009), and may also make a difference to environmental performance in craft villages, where there is a considerable gulf between rules-on-paper and rules-in-use. The political and economic reasons for this gap are explored here, which particularly arise from contestation over rules and access to resources.

Questions of knowledge, power and practice (Watts and Peet 2004: 20) are also core concerns in craft villages, where policymakes imagine craft producers as largely ignorant of the environmental risks associated with their production processes. Political ecology problematises environmental knowledge to understand, for instance the distribution and legitimacy of knowledge for different actors, and what kinds of knowledge are privileged in policy formation (ibid: 20). This theme is taken up in exploring the knowledge of producers on water pollution and its causes, perception of environmental risks, the current place of this local knowledge in policy formulation and decision-making, and the implications for policy implementation.

Finally, we return to the functioning of markets for craft commodities. The political ecology perspective, however, goes well beyond efficiency and pricing concerns of economics to consider how markets are configured, how they are being transformed, their spatial coverage, actors and their power and linkages, and governance structures that guide craft production and trade (Ribot 1998).

In summary, the current focus on pollution as a market externality has led to narrow understandings of the causes of pollution, with ineffective policy interventions. This research aims to build a richer understanding of the drivers of pollution from craft villages, asking what factors or pressures are driving the pollution of waterways around craft villages. To answer this, we address the key analytical components set out in Table 1. As the dominant emphasis in much of the literature on craft village pollution is from an economics perspective, we focus particularly on analytical approaches in commons theory and political ecology to gain new insights.

Table 1: Key analytical questions

Approach	**Core cause of pollution**	**Questions**
Ecological economics	Pollution as a negative externality	
Commons theory	Institutional and collective action problem	Are the rules appropriate? Are the actions of different actors coordinated horizontally and vertically? Are there other barriers to collective action?
Political ecology	Resource degradation as outcome of economic, social and political relationships, including access and control over resources	Does access to and control of resources (production resources, markets, knowledge, political power) impact on craft village pollution and how? What are the pressures on craft producers? Why is there a gap between rules-on-paper and rules-in-use?

3. METHODOLOGY

This analysis draws on secondary research, government documents and data from an ongoing research project to examine the drivers of pollution from craft villages in Vietnam. In collaboration with Vietnam's Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD), interviews and focus groups were held with a total of 106 informants in 4 craft villages, including officials from commune, district and provincial agencies. A further 7 interviews were conducted with staff of the national agencies responsible for craft village development and the management of water pollution.

Based on previous government research (MONRE 2008), the Red River Delta was already identified as a 'hotspot' for pollution from craft villages and was therefore selected as a focal area. An initial shortlist of potential case study villages was prepared incorporating:

- products types associated with high levels of water pollution, namely textiles, food processing and recycled paper production (MONRE 2008)
- villages with differing enterprise size (small to large) and number; and
- coverage of different provinces in the Red River Delta.

The final set of four case studies, selected during a scoping visit in July 2009, were selected for their information richness and relevance to the study.

At each site, the research team worked with commune officials to purposively select informants from different scales of enterprise (small to large), individuals with important community knowledge (e.g. commune officials, teachers, health workers), and households uninvolved in craft production (the latter category proved non-existent in most sites). Semi-structured interviews and group meetings were undertaken by 2 teams over a period of about one week, using common interview guides. Interview data was coded using Nvivo software.

To enable a sufficiently detailed analysis, this paper focuses only on 3 villages (see Table 2), chosen for their coverage of provinces, scale and sectors in the Red River Delta.

Table 2: Case study overview

	Duong Noi[1]	Phong Khe[1]	Moc Nam[1]
Craft villages studied	2 (Y La and La Noi)	1 (Duong O)	1 (Nha Xa)
Location	Ha Tay district, Hanoi City. 15 km east of Hanoi	Yen Phong district, Bac Ninh Province, 32 km northeast of Hanoi	Duyen Tien district, Ha Nam, 100 km from Hanoi
Population	17,000	8,546 (1,964 HH)	4,131 (1,211 HH)
Product	Polyester and cotton textile	Recycled paper	Silk
Number of craft enterprises	29 large; 800 small trading shops; 100 animal husbandry	194 (65 large; 200 small (UBNNPK 2009)	186 households with <290 looms; 2 medium; 30 dyeing
Number of interviews	18	27 + 1 focus group	43 + 1 focus group

[1]Commune name

Sources: UBNNDN 2009; UBNNPK 2009; TTPTVHN 2007

CASE STUDIES: TRANSITIONS, RELATIONSHIPS AND INSTITUTIONS IN THREE CRAFT VILLAGES

Craft villages have for centuries been integral to Vietnam's rural economy and society. Gourou (in DiGregorio 2001) suggests that peasants in the first half of the 20th Century supplemented their income through craft production because of an oversupply of labour in the agricultural sector and lack of farming land. The part-time production of crafts during "leisure" time is also attributed to the Confucian ideology, which places the social status of artisans lower than that of peasant farmers (Luong and Unger 1998).[2] Production was small-scale and undertaken at the household level.

An estimated seven per cent of the adult population was engaged in craft production in the Red River delta in 1930s (Gourou in DiGregorio 2001). They processed foods and manufactured agricultural and fishing tools, ritual goods, household wares, construction materials, paper, and textiles, as well as providing services and trades such as carpentry (Digregorio 2001: 62). Villages specialised in particular products for a combination of environmental, economic and social reasons (Gourou in Spitzenpfeil 1999). Trading networks developed, connecting villages to commercial centres and trade streets in Hanoi and elsewhere in Vietnam (Spitzenpfeil 1999: 121).

From the 1945 revolution to1986, craft production underwent several important transitions. The first Indochina war against the French from 1945-1954 against the French significantly affected economic activities in general and craft production too. With the defeat of the French in 1954, Vietnam was divided into North and South Vietnam, until reunification in 1975. The socialist centrally planned economy (since 1954 in the North and since 1975 in the South) destroyed many existing trade networks and curtailed the free development of craft villages (Spitzenpfeil 1999: 121). Artisans were made to join handicraft cooperatives that manufactured products to state plans and targets, which specified product quantities, type, design and price. Some goods were exported to other socialist countries such as Russia, China, East Germany and Poland. This highly controlled environment contributed to the gradual disappearance of many crafts that fell outside the perceived needs of the state (Dang et al. 2005: 12).

The *Doi Moi* (economic renovation) policy of 1986 moved towards a market-oriented economy, accommodating the private sector and redefining peasant households as autonomous economic units (Dang, 2009; Nguyen 2007). Household businesses and registered small and medium-sized enterprises (SMEs) emerged as dynamic force in the Vietnamese economy. Registered SMEs grew from 63,000 in 2002 to around 270,000 in 2007 (Nguyen 2007, Hansen et al 2004).

The demise of handicraft collectives and the redistribution of collective land to individual households under *Doi Moi* enabled villagers to develop their own family enterprises. Villagers could employ labour, determine the quality, quantity and type of products, and do their own marketing. The enormous domestic and international demand for

[2] According to Confucian values, traditional society consisted of four occupational groups in the hierarchy: 1. scholar, 2. peasant, 3. artisan and 4. merchant.

consumer goods saw the revival of crafts such as wood carving, weaving, pottery, and sewing, some of which had almost disappeared during collectivization (Spitzenpfeil 1999: 149). Under the new regime, a handicraft household could function as a small business with the family home serving as a production site and family members providing most labour (DiGregorio 2001). Only a small fraction of household businesses is registered (Hansen et al 2004).

The expanded handicraft industry now employs a significant proportion of the Red River Delta's population. The most recent government statistics indicate craft villages employ around 30% of Vietnam's total rural labour workforce (EPA 2009). The highest number of craft villages is in the Red River Delta, which accounts for about 60% of craft villages in Vietnam (MONRE 2008).

For administrative purposes, the government divides craft villages into six different categories: (1) food processing, including animal husbandry and abattoirs (2) textile production including dyeing, silk production and leather processing, (3) production of construction material and masonry, (4) recycled products, (5) handicraft production,[3] and (6) others.

As noted earlier, the contribution of craft villages to the rural economy and rural employment has come at the cost of severe environmental pollution. A recent government study found that 90 per cent of craft villages have levels of pollution that exceed standards set by the national environmental protection law (EPA, 2009). The type and level of pollution (including water, air and soil pollution) differs between craft villages. Water pollution is common to most craft villages; however, the highest levels of water pollution are associated with food processing, textiles and waste recycling, which informed the selection of case studies for this research (MONRE 2008).

In general, however, the most significant pollution impacts appear to be at the local level and immediately downstream. For example, a recent government study (MONRE, 2008) estimates that the life span of a craft producer in the Red River Delta is ten years shorter than the national average. At the larger river basin scale, the proportion of pollution from craft villages is relatively small in comparison with other sources of pollution (MONRE 2006: 28).

4.2 Nha Xa: a silk production village

Located near the Red River and about 55 kilometers southern of Hanoi, Nha Xa is the sole craft village among five villages in Moc Nam commune, Duy Tien District, Ha Nam Province. Nha Xa is recognized by the Province as a "traditional" craft village. Nha Xa's 242 households undertake several stages of silk production, which also involves interaction with actors outside the village (see figure 2).

Transitions

[3] Handicrafts (*thu cong my nghe*) refers to a high-value craft product created by highly skilled artisans that are considered to be fine art.

Villagers attribute the introduction of silk production more than 800 years to the legendary 13th Century military general Tran Khanh Du, who taught Nha Xa villagers how to cultivate mulberry, make silk thread and weave. Being near the Red river enabled the village to trade with others. Since 1280, Nha Xa's silk has gained recognition within and outside Vietnam (SHH&CNTHN, 2010). Historical records show that the Dutch East India Company was purchasing Nha Xa silk in 17th century (UBNDMN 2009).

Nha Xa silk production developed through periods of colonization by the French, due to a growing domestic and international demand and good trading networks linking the village with markets in Hanoi and Paris. However, the production technology was still simple and products were not diverse in types and color. One old man in the village recalled,

> In the past we were using manual looms to weave and running the shuttle by hands, and then moved to using the shuttle by feet. The productivity was low. We also specialized in dyeing but we used natural organic dyes such as plant roots, leaves and mud. Because we did not have any chemicals we had to use them although the color was easier to fade away than chemical dyes today. (85 years old male resident, Nha Xa, July 2010)

From 1958 to mid-1980s, like many other villages in the Northern Vietnam, Nha Xa underwent collectivization which significantly affected the direction and development of private silk production in the village. Artisans were forced to join a handicraft craft collective that was assigned to produce silk materials for a state-owned enterprise. This enterprise then exported the final silk product to the Soviet Union and Eastern Europe, according to state plans and targets. The collapse of these markets in the 1980s caused the closure of many export-companies and their sub-contracted collectives such as Nha Xa handicraft collective (Spitzenpfeil, 1999: 140).

The end of collectivization and opening of markets through Doi Moi revived private silk production in Nha Xa, with workshops mushrooming throughout the village. Several informants saw the early 1990s as a new "golden age" for craft activities. The high price of silk attracted most villagers, including officials, teachers and nurses, to engage in silk production (interview with a retired official, July 2010). Traditional production was gradually upgraded, with the introduction of chemicals product diversification. A 34 years old weaver described the transformation of his business and production technology over time.

> I learned weaving skills from my parents. This occupation was handed down from generation to generation. In 1988, this village was still using wooden weaving looms. In 1990, weaving machines made of iron and steel began to be introduced to the village. It's not until 1993 when motor weaving machines were put into use thanks to the installment of electrical wires in the village. In mid-1990s, my family bought a second-hand textile weaving machine from the Minh Khai Textile Company in Hanoi.

> We bought a cheap secondhand one because we could not afford to buy a brand-new one. After bringing it home, we had to repair, modify and upgrade it to fit silk weaving. Many households here did the same. In 2003, we bought 6 brand-new China-made weaving machines to extend the production scale. Chinese machines were affordable but their reliability was not very high. I would like to replace them with weaving machines of better quality but the investment capital is not affordable to me. (34 years old male weaver, Nha Xa, July 2010).

Since the 1990s, semi-industrial or industrial production methods became the norm. Traditional production technology, with low productivity and outmoded styles, could not keep up with market requirements. Manual looms were replaced with old industrial weaving machines from large textile companies in Hanoi or elsewhere, or new Chinese machines. Organic dyes were replaced with chemicals, mostly imported from China. Households started to specialise in aspects of the production process. Of the 218 (of 242) households engaged in silk production, about 186 focus on weaving, while 30 households and 2 large workshops bleach and dye the silk. Non-production households worked as traders, sub-contractors or workers for these weaving and dyeing households or engaged in farming or other non-farming activities (Moc Nam officials, July 2010; UBNNMN 2009, KHCNTHN news 2010).

The transformation in production methods enabled Nha Xa to increase production capacity and quality, and to diversity products to meet market demand. Each year the village produces an estimated 1.2-1.8 million meters of silk and satin fabric for domestic markets in Hanoi, Ho Chi Minh, and Da Nang and for export to France, USA., Thailand, and Cambodia. Silk production employs about 650 residents (both above and under the legal working age) and 150 non-residents from neighboring villages. Craft activities are the main source of income for Nha Xa individual households rather supplementing farming as before. Monthly per capita income was estimated at around VND 1,000,0000 (USD50) in 2009, while farming was insignificant as an income source (UNNDXMN, 2009).

The intensive use of chemicals and its untreated discharge from bleaching and dying activities has heavily contaminated the Nha Xa environment, especially surface and underground water. Each year the whole village burns an estimated 170 tons of coal and charcoal in backyards, uses 30 tons of dying chemicals mixed in rudimentary outhouses; and discharges about 20,000 cubic meters of highly polluted waste water into the ponds and channels surrounding craft producers' homes (UBNDXMN, 2010). Given high population density and the use of homes as production sites, there is a high level of ecological interdependence amongst village households. Waste discharging into one household's pond can affect other households' ponds as well as village CPRs in general such as surface and ground water. A resident in Nha Xa complained,

> Regarding surface water quality, it's so polluted now that nobody dare use any pond water for domestic use. In the past it was clear but now it's polluted from chemical discharge. I'm also concerned it will pollute

> the underground water system. The water has a very bad smell – when it evaporates into the air the smell is really sour. Now none of the children ever dare to play or swim in the pond (Female, Womens' Association leader, Nha Xa, July 2010)

Significant impacts were reported on the general health and well-being of all village residents, including non-producers. Pollution in Nha Xa was blamed for high rates of respiratory disease, intestinal disease, sleep disorder and skin disease, especially amongst those involved in bleaching and dying. A female weaver living next to a dying workshop said,

> Regarding health impacts, of course there are big impacts. Maybe there is even a potential risk to me. The children can't learn to swim in our ponds like in the past. Many villages have reduced health and more women have diseases, such as lung disease, and diseases of the digestive system. …There is more disease among women, also higher incidence among young women. Malnutrition rates are higher. Among the women – around 70 per cent have gynaecological disease. I know the pollution may have some effect on pregnant women, like when they take a bath, or drink water. If you eat vegetables grown near the edge of the ponds you can get stomach problems….There are 3 or 4 cases of stomach cancer (Female weaver, Nha Xa, July 2010).

The main source of water pollution in the village was bleaching and dyeing workshops that emitted waste water without treatment. However, the underlying drivers of this pollution were complex, including the characteristics and internal constraints of individual workshops, and broader socio-economic, political and institutional factors discussed below.

Actors, resources and relationships in production

Like many other craft villages, Nha Xa is more than just clusters of homes. Kinship and other social networks are important to its socio-economic and administrative functioning. Historically, the villages were close-knit communities with a high degree of autonomy vis-à-vis other villages and state. The village had its own rules to exclude non-residents from learning "the secrets" of their production techniques. Villagers recalled that, to exclude others from learning their silk production techniques, village girls were once forbidden from marrying into other villages (Focus group, Nha Xa, July 2010).

Today the village has more open interaction and exchange, but has retained its complex social ties and relatively high internal socio-economic interdependence. Constraints to land, capital and capacity have often led individual craft households or enterprises to specialize in one part of the overall production process for a craft commodity. For example, the final product of dyed silk involved at least 4 different stages of production involving different households. Figure 2 demonstrates this complex network of relations and linkages.

Figure 2: Production processes and relationships in Nha Xa village

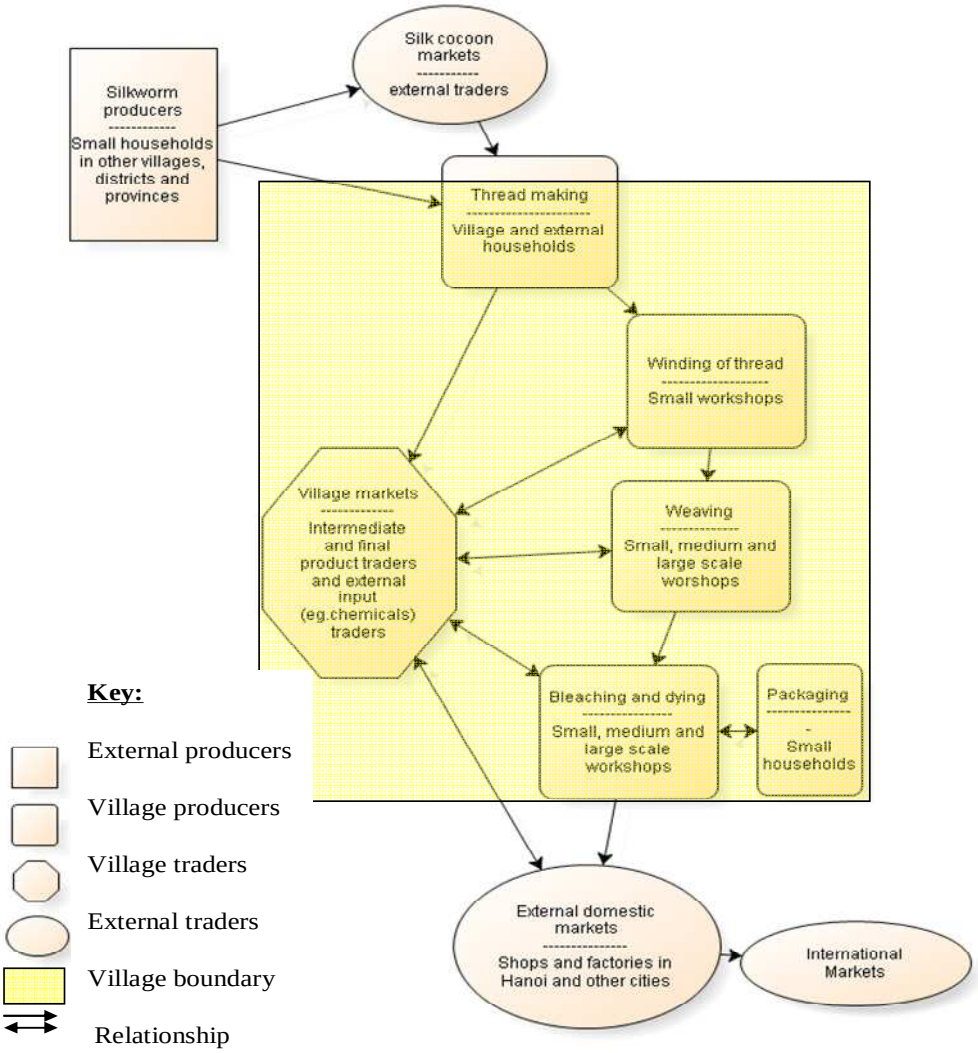


Figure 2 shows silk thread is brought from outside Nha Xa village, but the key phases of preparing thread for weaving machines, weaving and dying are specialised activities are distributed between different households in the village. Only the few larger workshops are able to undertake all of these activities under one roof. Buyers are based in urban centres and internationally. Like many other businesses in Vietnam, actors along the silk production chain have long-term relationships and involve trade credit. In his study on commercial regulation in Vietnam, Gillespie finds that stable trading relationship based on family connections or friendships were overwhelmingly considered more important than formal law (Gillespie, 2009).

The most polluting stages of production are bleaching and dying, undertaken by 30 households and two larger workshops. Although regarded as polluters, bleachers

and dyers are essential in their value addition to silk textiles, as the market only demands the finished textile.

The numerous dispersed sources of pollution through the village make it difficult to monitor or build common water treatment facilities(Interview, Nha Xa, July 2010). Bleachers and dyers expressed that, although bleaching and dyeing workshops were amongst the most profitable on the intra-village value chain, their margins were too small to allow them to treat the waste water. They also expressed that their profit levels were low compared to external traders and exporters (Focus group, Nha Xa, July 2010).

Although residents ranked pollution as their most pressing concern, there was an absence of pressure on bleaching and dyeing workshops to mitigate pollution. Reasons include conflict avoidance and the recognised place of dying in local livelihoods and market access:

> "We are dependent on each other."
>
> "We don't want to have quarrels with each other; we want to live in harmony."
>
> "We are relying on each other to make a living. No matter how much wastewater bleachers continue to discharge, other residents still have to sell their goods to them. We can not force to shut down their business; if we do so, silk production and livelihoods of all households in the village are affected." (Focus group, Nha Xa, July 2010)
>
> "One time all the fish died and a sack of dying fish came out of my pond. But I couldn't ask the producer for compensation, because they are all my relatives. It's their job and I can't stop them from doing their business, although I know that the wastewater is very harmful to our health". (Female weaver, Nha Xa, July 2010)

Nha Xa residents indentified several key constraints in addressing pollution. First, individual workshops often lack capital, land and knowledge about treatment technologies. The prohibitive cost of individual treatment relative to the small profits earned from small-scale family-based production meant that craft producers prioritized their livelihoods and market competiveness over environmental risks. Second, implicit competition among individual workshops over land, together with limited capital and power in decision-making, hindered collective action on pollution (Focus Group interview, Nha Xa, July 2010). For example, one proposed solution of concentrating workshops in a production zone with common water treatment was questioned because of the large land and capital requirements, beyond local capacity and control. Producers suspected that this would increase their costs, making their product uncompetitive in highly competitive markets. So, although government considered pollution an individually produced externality that polluters would address when fines exceed the cost of innovating, producers instead demanded external support, especially from government. A dyer argued,

> Building a production concentration zone will need land, capital and technology so the producers cannot do it themselves, there should be a role of the government. The government should pay for the initial costs, when it is running smoothly the households will join hands to do it. (Male, small-scale dyer, Nha Xa, July 2010).

Rules-in-use

With provincial agencies demonstrating little interest, the task of environmental protection in Nha Xa fell to lower level district and commune authorities that lacked the authority and capacity to monitor pollution and enforce compliance to regulations by the many family-based and unregistered craft enterprises. Almost all producers in Nha Xa did not know about nor conformed to the formal rules and regulations regarding environmental protection set by the state. Nha Xa commune's environmental officer commented,

> We sometimes monitor and are able to apply some limited administrative punishments such as penalty of limited amount or violation fees on those who violate environmental production regulations. For example, in 2009 we fined two dyeing workshops that seriously polluted the environment. However, it is difficult for us to punish people because they can't treat wastewater at each household business. It's really hard and people often refuse to pay fees. (Male, Moc Nam officer, July 2010).

Local authorities are also challenged by conflicting interests between promoting local economic development and managing the negative impacts of environmental pollution. An official in Moc Nam commune commented,

> The local authority can shut down the operation of seriously polluting enterprises in the village by enforcing laws, but then, what can they and other dependent households live on? Any policy needs to take people's livelihood into consideration. If we close them, we need to ensure their livelihood and economic development (Male, Moc Nam official, July 2010).

In the absence of systematic and effective environmental protection by government agencies, residents in Nha Xa have organized their own sanitation activities through state-initiated mass organisations such as the Veterans Association, Farmers Association, Women Union, Youth Union and the Elderly Association. Activities centre on awareness-raising and mobilizing residents to regularly clean roads, dredge ditches, and collect domestic waste. Households are also encouraged to build tanks using sand, soil, and stone to purify wastewater. Some grow lotus or duckweed in their home ponds to make water cleaner. The village also tries to incorporate environmental protection into informal rules and norms but in the absence of enforcement there is little compliance (Focus group, Nha Xa, July 2010).

4.2 Phong khe, a paper recycling village

Located in Yen Phong District, Bac Ninh Province and about 32 kilometers northeast of Hanoi, the recycled paper village of Phong Khe is a craft commune consisting of 4 craft sub-communes (Duong O, Dao Xa, Cham Khe and Ngo Khe). Duong O and Dao Xa are the craft sub-communes where the majority of medium and large enterprises are located, and farming has become insignificant.

Transitions

Phong Khe has produced paper since the 15th Century or earlier (CTPTVHN 2007). Traditionally the village produced *Do* paper, made from the bark of the *Do* plant (*Thymelaeaceae* family), used in calligraphy, painting and fireworks. Before 1986, aside from working for handicraft or farming collectives, Phong Khe households engaged in producing *Do* paper at home, including cardboard, tissue, stencils, firework paper, and fan paper. This was for domestic markets to supplement their income when time permitted. Since Doi Moi, the paper production industry was revived, with many households establishing their own workshops, expanding production, and adopting new machines and technology (see Table 3). Following the decreased demand for *Do* paper wrought by a 1994 ban on fireworks, paper production in Duong O shifted to mechanised systems using recycled paper (DONRE, pers comm. 14 December 2009), to produce toilet paper, tissues, votive paper, kraft paper and printing paper (field data; Van Ha 2005).

Table 3 The growth of recycled paper production in Duong O, Phong Khe

Year	production lines	productivity (ton/year)	revenue (billion VND)	Workers
1990	20	n.a	n.a	n.a
1995	45	18000	36	1000
2000	95	45000	78	2200
2005	168	122000	300	3000
first 6 months of 2009	210	90000	240	3800

(Source: UBNNPK 2009).

One enterprise owner explains that the growth of recycled paper production was largely a spontaneous local response to new market opportunities, with little planning or government support:

> "Since the early 1990s we installed machines – before that we did everything by hand. Then we had to fill up the ponds to build our place and some people didn't have enough money to rent space in the industrial zone so they installed machines in their house. We were too dynamic – developed too fast without planning." (Male, medium-scale enterprise owner, Phong Khe, December 2009)

> "... in this village we developed everything before you gave us the policy or introduced any regulations." (Male, medium-scale enterprise owner, Phong Khe December 2009)

Two main factors enabled this scaling up. First, the closure of village cooperatives with *Doi Moi* enabled individual households to purchase machines from the old cooperative workshops. Second, enterprise owners drew capital for expansion from their own savings, from family members and neighbours, moneylenders or formal credit funds. Later when land was titled, households used it as collateral for loans from commercial banks. Prior research in Phong Khe suggests that enterprise owners saved, on average, about 85.7% of their income (an estimated US$4,600 per year, Van Ha *et al.* 2004).

With 210 production lines, Phong Khe is able to produce nearly 180,000 tons of paper yearly with revenue of VND 810 billion (USD 40 million). Aside from direct employment of 3800 workers, recent estimates suggest that paper production in Phong Khe creates indirect employment for over 200 local households, and countless others beyond the village who collect, sort, clean, trade and transport wastepaper, input materials and finished products (UBNDPK 2009, Van Ha 2005). It is difficult to find households in Phong Khe that are completely uninvolved with paper production. For instance, the owner of a small goods store, and the wife of the local mechanic both transported and traded used paper and finished products.

Water pollution is a pressing concern in Phong Khe, with recent estimates that paper factories discharged 3500-4000 cubic metres of waste water per day, raising pollution indicators far beyond national standards. Surface and underground water are both contaminated (TTXVN news, 2010), leading to high incidence of skin and respiratory disease. While the link is yet to be firmly established, cancer is also increasing, with 78 people, many of them young, dying of cancer in the past two years (SGGP news, 2010).

Whether informants were enterprise owners or not, there was unanimous recognition that water quality was declining, which was directly attributed to paper production. This can be seen in the following comments – the first from a predominantly farming household and the second from an enterprise owner:

> For agriculture we use water from the river but it is terrible. Because the waste water in the river will run to the rice field. So we feel miserable when we have to use this for agriculture... We can't stand the smell. (Female farmer, Phong Khe, December 2009)

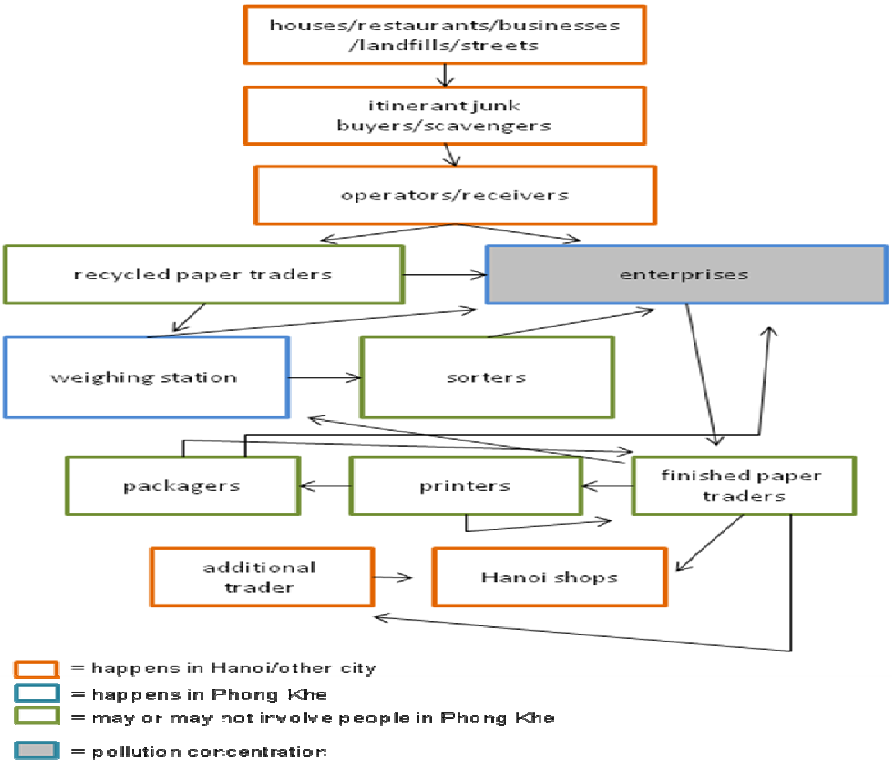
> I rate the water less than 1 out of 10 because of the pollution. I know many researchers come and say our water quality is lower than the standard... I think it is because of the chemicals in the village. (Male small enterprise owner, Phong Khe, December 2009)

A focus group of enterprise owners and other key informants attributed water pollution to untreated waste from recycled paper production, and the rapid and unplanned growth of this industry in Phong Khe, which outstripped the capacity of local infrastructure. Participants demonstrated a high level of understanding both of the pollution issue, and the complex nature of its causes.

Actors, resources and relationships in production

A commodity chain analysis of one paper product – recycled toilet paper – highlights the complex linkages between actors involved in production (see Figure 3). Many of these actors are co-located within the village, specialising in one of several stages of paper production. This contrasts with the Duong Noi case discussed later. Often these actors are dependent on each other economically, socially and environmentally, with long term and complex trading relationships. Government is notably absent from this figure, reflecting producers' views that they received little tangible business or technical support from government and thus it was not a key player in the production system.

Figure 3 Actors in the recycled toilet paper commodity chain



Source: Gasparini 2010

Paper enterprises reported that markets for their products were relatively stable, as was the supply of input materials and labour. In larger operations, much of the labour – for instance to sort paper and work on production lines – was hired from nearby rural areas.

Land was repeatedly identified as the main constraint to expanding production and building treatment facilities. One concentration zone of 2.8 ha for 15 enterprises was built in 1995, and a second one of 12.7 ha for 60 enterprises was built in 2001 (UBNDPK 2009). A third was under development during fieldwork. A pilot water treatment scheme, sponsored by an International donor, had been trialed in one of these zones, but there was no other water treatment infrastructure. The Bac Ninh Department of Natural Resources and Environment reported that new land in the industrial zone, instead of being used to relocate and concentrate existing operations, was being used by producers to expand their production space:

> "This is very difficult – when we make the plan they all say they want to move. But when they get their plot of land they stil produce in the house. They have 2 production sites. Our intention is they will move to the industrial zone but they use it to expand production. (DONRE official, Bac Ninh, December 2009)

The lack of treatment infrastructure and use of zoned land to expand rather than relocate production rendered zoning an ineffective solution to water pollution.

Rules-in-use

At the commune level there was a system of fees in place for houses with access to piped water, but otherwise no rules to guide water use or discharge by producers. Although Van Ha et al. (2004) report high levels of social capital in Duong O, which could provide a basis for collective action, collaboration on production related matters appeared limited. Only half the producers interviewed participated in a producers' association, whose main role was to reach agreement on prices. This association was established by local authorities rather than a voluntary association, which may explain weak participation and lack of trust among its members.

Those that did not participate in the association reported a low level of cooperation amongst producers across a whole range of areas:

> We cannot cooperate. We need an association but we have no opportunity to cooperate. We have to compete with them.... I am so sad when we talk about cooperation.... You know the government funded us in one project – JICA funded us to cooperate. However the managers who came to the project felt reluctant, resistant. The members who joined the groups did not want to share information.... I understand you have some secret technology or skill to keep but information about policy should be shared. We should share information to improve this country. (Male medium-scale enterprise owner, Phong Khe, December 2009)

National regulations on pollution fines were mainly enforced for medium and large scale enterprises. Province authorities stated that licensed businesses were the only ones over whom they had any enforcement power, due to their control over licensing:

> It is difficult to go to families and collect the fees... Local people feel reluctant to pay or feel they have no responsibility. I estimate about 20% of businesses pay – the ones that pay have a close relationship with government because they come here to apply for licence and we can urge them to pay... (DONRE, Bac Ninh Province)

In general, Phong Khe paper producers bemoaned the lack of government support for their businesses and for management of the waste water from their enterprises. Two particularly raised the fact that, although Phong Khe producers make "use [of] the materials that others throw away", they were taxed at the same rate as large industries.

4.3 Duong Noi: a textile village

Located about 12 kilometers from central Hanoi, the commune of Duong Noi includes three traditional weaving villages (La Duong, La Noi and Y La) that have reportedly practiced textile weaving alongside farming and other activities for centuries (Duong Noi Commune Peoples' Committee, pers. comm. 19 July 2009). During fieldwork, much of the farmland surrounding Duong Noi was being reclaimed by the State, making land a major focus for the residents.

Transitions

Two identifiable transitions in Duong Noi include (i) the emergence and expansion of private and specialised weaving enterprises since *Doi Moi* and (ii) pressures on access to land created by urban expansion and State land acquisition.

Following *Doi Moi*, a major turning point for Duong Noi was the collapse in 1990 of the Soviet Union and eastern European markets for its silk and satin. The more entrepreneurial villagers used their traditional knowledge of weaving to establish their own workshops for weaving, printing and dying. The commune now has an estimated 20 large workshops and several smaller ones that collectively employ around 1000 labourers (Duong Noi Commune Peoples' Committee, pers comm., 19 July 2009).

The weaving enterprises in Duong Noi ranged from relatively small to industrial scale – the smallest having 10-20 mechanised looms, and the largest over 40 weaving machines. Most such workshops were established in the 1990s. Ownership of round weaving machines for knit-fabric was indicative of a strong capital base, as these machines were imported and much more costly than the more prevalent "water looms". Only the two largest enterprises were registered as companies.

The closure of weaving cooperatives under *Doi Moi* enabled weavers to set up independent workshops. Often the equipment in these early businesses was purchased former cooperative workshops as well as from the south of Vietnam:

> We started from a subsidiary economy with two cooperatives for handicraft weaving: Truong Suon and Viet Hai cooperatives. From 1985 these two went bankrupt and the private households started to buy back the machinery from old cooperatives – we bought manual machines. The market demand grew so year after year we would invest in new machines and each year buy new second hand machines... Before 2008 we had 15-20 weaving machines and 5-6 machines for dying." (Male large weaving enterprise owner, Duong Noi, April 2010)

Businesses grew as a spontaneous, locally driven response to new market opportunities, with little or no planning. Similar to the other cases, workshop owners mainly funded their establishment and scaling up costs through their own savings and by mobilising family capital. A small number of medium to large scale enterprises also took bank loans. With land for production space at a premium, most larger operations developed workshops on their allocated family farmland or 'purchased' the lease (i.e. the red book certificate) from others. In most cases the farmland was not reclassified as residential or industrial as required by the land law, but informally accepted by the commune authorities. One owner stated:

> …our workshop is on farm land – we bought it already from others. Every enterprise wants a larger area for production. Our land is under a 30 year lease - we have finished some years already. (Male medium-scale enterprise owner, Duong Noi, April 2010)

This strategy of using farmland for production space has led to workshops being widely scattered throughout the villages and commune. The use of farmland for workshop

space has also reinforced their specialisation in textile production – no workshop owners interviewed still had farming interests.

More importantly, the strategy of using farm land for production made craft producers vulnerable to land acquisition. Compared with the other craft villages, land pressures were most significant in Duong Noi due to the rapid growth of housing estates and service centres on the Hanoi's urban fringe. This had significant implications for those outside the craft trade too, as the state had forcibly acquired land from farming families and craft producers alike. During land acquisition, compensation was paid at the rate of rural farming land, but the land that was immediately rezoned 'urban' and its value skyrocketed.

The high costs inflicted by land acquisition are highlighted in this story of one producer who had lost a large section of their workshop for a road – a new wall had been built on the section of the workshop that remained after demolition:

> My brother and I own an enterprise which has lost some land through compulsory land acquisition. About 7 workshops have been affected by the road widening in this area. We lost one third of our land and had to sell around 20 machines. We had bought these machines at 500 million dong per machine and sold them at 250 million dong – we lost a lot of money....
>
> No one wanted their land to be acquired but we had to agree because of the road. This is classified as farming land so the compensation was low – we got 97 million dong per *sao* (360 square metre). (Male medium-scale enterprise owner, Duong Noi, April 2010)

Because of this instability in their production base, and the associated livelihood risks, all the producers interviewed In Duong Noi as well as commune officials were in favour of a dedicated industrial zone, This was expressed as a desire for a stable production base, without which producers felt unable to improve their production technology. For instance:

> I desire to upgrade my machinery but because my production site not stable I will not do this. (Male medium-scale enterprise owner, Duong Noi, April 2010)

This desire to relocate to secure ground was strong even in the face of the considerable costs of building a new workshop and transporting equipment to a new production site.

Perceptions of environmental change differed significantly amongst informants. Those working outside textile production rated water and air quality in Duong Noi very poorly, while textile workshop owners were more circumspect in their views on water pollution, or attributed it to a range of sources aside from textile workshops. For example, asked what causes water pollution, one producer said:

> Actually I don't know. The river runs through many other provinces and some years I see the water level is very low and not as high as some years in the past. All households drain their water to the drainage system and this flows into the stream. There is waste from livestock production, domestic use. All villagers

round here, they all discharge their waste. (Female, medium-scale enterprise owner, Duong Noi, April 2010)

This contrasts with the perspective of a local teacher, who squarely attributed environmental pollution to textile workshops and, to a lesser extent, livestock:

> Crafting affects the environment and the school is directly affected. Last year and the year before after a batch of dying they released an air pollutant – it would last for a few hours in the school. In the past, before the tall building was built behind the school, some teachers working there had to wear a mask during class when teaching because there were little particles of fabric in the air.... Water drainage from the village kills all the aquatic animals so it must be polluted.
>
> [This is caused by] printing workshops and livestock production that release water without treating it. But the greatest danger must come from printing." (Primary school teacher, Duong Noi, April 2010)

Actors, resources and relationships in production

Unlike the other cases, in Duong Noi, the main stages of textile production – weaving, dying, printing and marketing – were usually handled within one enterprise. This was particularly true of the medium and large weaving workshops, which had the capacity and space to undertake all of these functions. Inputs such as thread and dyes were imported from outside the village, or purchased from a local agent, such as the local Taiwanese distributor for dyes and thread. Producers sold their textiles directly to buyers through stalls at the Dong Xuan market in Hanoi, or through established direct trading relationships with buyers in other parts of the country and overseas.

The production system had a low degree of interdependent on other villagers. it was unsurprising in this context that there was very limited collaboration reported between producers. The existence of a village level craft producers association was mentioned by one or two producers, but most had not heard about or participated in such an association. A son of a textile producer explained that this had both a cultural and economic basis:

> Economists will think specialising in one step is more efficient... But many people think if they do all the processes they won't have to pay other people. Each step would get some of the profit – and if they do it all they don't have to pay this profit to someone else. Vietnamese businesses haven't realised the benefits of cooperation – they do this in Japan but not here – its not part of the Vietnamese way.... (Male tertiary-educated son of a large enterprise owner, Duong Noi, April 2010)

The threat of forced land acquisition had stimulated collaboration on the issue of land security. A group of producers had written to the Commune Peoples' Committee and the Hanoi City Peoples' Committee requesting that secure land be provided for producers in an area zoned for industrial use. One producer, who had received a letter that his workshop land was being acquired for urban development, observed that

getting producers in this manner was not natural or easy, even noting that it was indicative of their difficulty in collaborating to address water pollution:

> Just to write a mutual letter is difficult; how can we cooperate on waste water treatment? (Male medium-scale enterprise owner, Duong Noi, April 2010)

Rules-in-use

Interviews found no informal rules and norms for water use or waste water management.

Many of the enterprises interviewed mentioned regular monitoring visits by the Environment Department to check on pollution levels ("they come here continuously" according to one owner). These staff would determine the level of pollution during their visit, and issue an administrative fine if deemed necessary, or recommend changes to production processes. Some noted that enforcement of fines was variable, and subject to corruption, which reduced producers' faith that the system:

> ...it's the time when every enterprise is very aware of the alarm being raised about environment. It's time they have very fair and strict rules that apply to all enteriprises, but actually the government body is not objective and under the table money is going on. (Male medium-scale enterprise owner, Duong Noi, April 2010)

In 2008 A realignment of the City of Hanoi boundary brought Ha Dong District, which covers Duong Noi commune, under City administration. Enterprise owners had observed stricter enforcement of the pollution regulations since that change:

> It's more tiring when Ha Dong joined Hanoi. In Hanoi people are richer, have more money, its more complicated. Management is tighter. Hanoi has stricter rules. (Male owner of a medium-scale enterprise, Duong Noi, April 2010)

A further aspect of this realignment of local government is the relative lack of influence remaining with the commune, for instance in gaining access to information on the urban development plans, which the City of Hanoi was treating as "Commercial-in-Confidence". Another example of their lack of influence was the inability of commune officials to make a case for the provision of an industrial zone for textile producers – the decision rested at the City level, and competed with the City authority's plans for urban residential development.

5. DISCUSSION: DRIVERS OF WATER POLLUTION (8)

5.1 Resource access and control

In all three communes, land and capital made a significant difference to the issue of untreated waste water. Awareness of the causes of pollution was in general high and complex, particularly in Moc Nam, where the local response to pollution has in a recent study (Mackay 2010) been represented as a "calculated risk" rather than ignorant inaction.

In contrast to private ownership land tenure in the West, Vietnam's land tenure's system is distinguished by notions of state ownership and rights of land users. All land, according to law, belongs to 'the entire people' of Vietnam and is managed by

the state. In practice, local governments (often provincial and district authority) represent the state to manage the land following national guidelines and laws. Land users have use and transfer rights formalised in a “red book certificate”, which bestows rights for a limited period of time rather than perpetual ownership - 20 years for annual crops and 50 years for perrenials (Kerkvliet 2006).

Land insecurity and related disputes between land users and state agencies are common when the state reclaims land for highways, commercial centers and residential space for expanding towns and cities, industrial zones, factories, and even golf courses (Kerkvliet, 2006). The case of Duong Noi most starkly illustrates the role of land security in shaping craft producers’ decisions on whether to commit to improved waste water treatment. Given the already low position of water treatment within producers’ priorities, the lack of land security makes the likelihood of such investment negligible. Indeed the land issue in Duong Noi created poor relationships between villagers and the State, which significant implications for regulatory compliance (see 5.3).

Where zoned land was made available to producers, it tended to be taken up by medium to large scale enterprises that saw an opportunity to expand their production base, as seen in Phong Khe. Smaller producers in Phong Khe and Moc Nam were less able to bear the costs of moving, and preferred the relative convenience of working from home. In some cases, production secrets, for instance in dying combinations or designs, fueled a desire to keep production within the safety of the family home, away from the prying eyes of competitors. In any event, the lack of common waste treatment facilities in the industrial zones did little to alleviate the release of polluted waste water.

Given that the majority of craft producers were solely dependent on production for their family livelihoods and had low profit margins, maintaining market competitiveness was a priority, leaving little room for investment in the luxury of water treatment to meet national standards. This was seen most clearly in Nha Xa (Moc Nam) where producers repeatedly cited the need to keep production costs low, to compete with producers in other parts of Vietnam and also China. Phong Khe enjoyed a relatively unique position in the northern part of Vietnam, but producers remained sensitive to this issue. This underscores the fact that unilateral action by producers to treat waste water is extremely unlikely.

In short, access to land and capital, as well as livelihood imperatives and market competitiveness were critical influences on decisions about waste water treatment. These need to be considered alongside the institutional factors which, along with treatment technologies and local awareness, are the more common focus in pollution interventions.

5.2 Institutions and the gap between ‘rules on paper’ and ‘rules-in-use’

In common property theory and ecological economics, the existence of appropriate rules and norms is central to solving collective choice problems. However, state

regulations and fees to reduce waste water have proved largely ineffective in craft villages for a number of reasons.

Field data demonstrates that the individual producer needed confidence that they were not being asked to take action unilaterally and suffer a market disadvantage. Producers expected some certainty that other producers - within their village and in other parts of Vietnam - would also act, but had little trust that this would occur given the poor record of compliance and enforcement in their own communities. For recycled paper, the competing producers to Phong Khe were located some distance away in other parts of Vietnam. Textile producers had competitors elsewhere in the country and internationally. Furthermore, many producers highlighted that waste from other sectors should also be addressed, particularly untreated urban waste and animal husbandry.

A key related issue was the perceived legitimacy of the state. Craft enterprise development had been spontaneous and self-driven, with no planning or visible assistance from the state. The craft village classification, ostensibly a basis for supportive policies to encourage rural industrialisation, had brought little such support from the perspective of producers, most strongly expressed in the Phong Khe and Duong Noi cases. Meanwhile, the main interface with the state around craft production was athrough attempts at regulation – fines and requirements to produce enviornmental management plans – that were, for obvious reasons, perceived as unfair and illegitimate. Moreover, most craft workshops were unregistered enterprises, not subject to or not willing to be under the regulatory requirements applying to larger registered enterprises. The unofficial nature of craft enterprises further challenged the application of state regulations and surveillance.

The commune administration, which was geographically and socially closest to the villagers, showed greater understanding of their sitituation and enjoyed a higher level of respect from producers. However, being at lowest level of the administrative power structure, with low resource and capacity, the commune's authority was weak on issues of land and infrastructure. For instance, in Duong Noi, the commune authority was powerless to deliver the most prized outcome of allocation of land for an industrial zone – this decision rested with the seemingly remote City of Hanoi. Furthermore, the commune was placed in a position of intermediary between higher authorities and local people, which gave rise to conflicting interests. One the one hand, communes had to implement state policies; on the other they wanted to protect their local livelihoods and economic development. Consequently, local implementation of state policies was variable and highly dependent on local officials' perceptions and interests.

Perceptions of state ineffectiveness in in addressing matters of immediate concern to craft producers were underpinned by capacity issues in state agences as well as corruption. According to Suu (2007: 332), there are three major areas of corruption in rural Vietnam: in the management and use of land, construction of infrastructure, and financial management. All three of these closely intersect the issue of water pollution, in the establishment of industrial zones, water treatment facilities and fines for regulatory infringements.

Provincial Departments of Natural Resources and Environment (DONRE), a key player in managing water pollution, were understaffed, underskilled, and showed little evidence of coordination with other levels of government or other sectoral agencies at the provincal level. Provincial authorities stated a need for national agency support, while national agencies asserted that provinces had budgets for environmental management, but were under-investing because they assigned environmental protection a low priority.

Within communities, institutions and the conditions for collective action were relatively weak. There were no norms or rules for water use and treatment, and collaboration between producers on matters of mutual interest was weakest where large producers predominated, in Duong Noi. Phong Khe, which had a broad spectrum of production scales, and had a more mixed picture of collaboration – for instance an enterprise association was in existence, but not all producers were aware of it or participated actively. In Moc Nam, where small scale producers were prevalent and the production chain was highly interconnected within the village, informal collaboration was notably strongest. This did not, however, extend to matters of waste water management, which was seen as the State's domain and out of the producers' capacity.

6. CONCLUSIONS

Contrary to the assumptions behind current regulations, craft producers in Moc Nam, Phong Khe and Duong Noi are driven by a complex set of considerations that go well beyond whether or not they are required to cover the economic cost of polluting their environment.

Limited or insecure access to critical resources such as land and capital are central in decisions to change production systems. Land insecurity and scarcity is a particularly critical and chronic issue for craft producers, given the informal nature of most businesses and their consequently fragile rights to production space. This was most striking in the case of Duong Noi, where the state has procured such production space for higher value competing uses, with low rates of compensation to craft producers. The informal nature of their business also makes it difficult to access commercial loans and directly sell their products to international markets. This is a key area where craft enterprises differ from larger registered industries.

Relationships between craft producers and state actors at various levels – district, provincial and national – were very low on trust and collaboration. Instead of its current, albeit weak, regulatory emphasis, craft producers wanted greater support from the state in dealing with the costs of infrastructure and technologies for waste water treatment and other aspects of business. Commune authorities sat in an uncomfortable space between intra- and inter- village actors, able to sympathise with the needs and imperatives of craft businesses, often as former craft producers themselves, but also answerable to the regulatory imperatives of the state. The power dynamic was complex. Implementation of regulations varied from village to village, depending on location , perceptions of local officials, and level of legitimacy ascribed to the policy by local producers. It was strongest in the Duong Noi case, where the City of Hanoi kept a

closer eye on producers and pollution while regulations went unenforced in Nha Xa. In other cases, producers demonstrated a high level of agency in their choices to comply or not comply with regulations, while regulators were often left to look on helplessly. The greatest 'hold' was over larger scale enterprises that had or were proceeding towards formalising their business thorugh registration.

There was a strong correlation between conditions for collective action on pollution and the interdependence of production processes at the village level. It was strongest in Nha Xa, where interdependence between households involved in different aspects of silk production was high. Here, the main constraint to addressing pollution was capital and land. It was weakest in Duong Noi, where all the processes from weaving through to printing and dying often occurred under one roof. This suggests that strong community collaboration on pollution abatement may be more realistic in some villate settings than others. Unilateral action by producers cannot proceed, because of the low profit margins in comparison to the enormous cost of waste treatment and implications for market competitiveness compared with other producers within the village and elsewhere.

Finally, the cases demonstrate that craft enterprises are often small, informal, with low margins, many competitors and low capacity/willingness to invest in new technologies. The solutions therefore lie beyond the application of market based instruments and the polluter pays principle. Instead there is a need to recognise and work with the complex imperatives driving craft producers around land, power and social relationships, particularly relationships among producers within the village, between villages, between producers and agents of the state, and amongst the various actors along the value chains.

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