Environmental Issues in an Age of Regional Autonomy: The Case of Pollution in the Plantation Sector of North Sumatra

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ABSTRACT

Discussion of the agro-industry sector to date has largely neglected the significant impact of Indonesia's extensive plantation sector on the rural environment. This article discusses this problem in North Sumatra, the historical centre of Indonesian agro-industry, examining the underlying factors leading to the failure of legal and economic instruments to control agro-industrial and plantation activities before and during decentralisation. It examines the reasons for the failure of bureaucratic regulation, arguing that the underlying problems of political accountability of state officials continue to undermine law enforcement. As well as improving the accountability of state officials, a policy to mitigate the large-scale pollution associated with the sector needs to be better crafted to suit the characteristics of the industries concerned and address the wider socio-economic realities within which the problems are embedded and where any policy tool must be applied. The sector can be profitable without having to harm the environment through both self-motivated changes and government support.

Although the government of Indonesia has created a legislative framework for pollution control, rubber factories and palm oil mills across the country continue to generate large quantities of solid waste, air and water pollution. A key factor behind this is that many institutions and interpersonal relations are involved apart from the legislative framework, and are often beyond the reach or even knowledge of the policy makers and legislators (Eckersley, 1995).

While scholars and activists have widely addressed the problems of deforestation, forest fire and haze associated with plantation expansion, they have largely neglected the environmental issues of air pollution and effluent in the rivers (Kantor Menteri Negara Lingkungan Hidup, 1998; IFFM/GTZ, 1998; Gonner, 1998; Gellert, 1998; Down to Earth, 1998; Casson, 2000; Alwy, 1998; WRM, 1998; Wakker, 1999). The latter are major problems affecting the quality of life of local communities living around crumb rubber factories (CRFs) and oil palm mills (OPMs), and are crucial in the environmental context.

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Following a brief general background, the paper considers the adverse environmental impacts of rubber and oil palm factories, going on to scrutinize the evolution of state policy to deal with these difficulties. It then examines the ways in which policy approaches are changing during decentralization. It finally discusses how particular policy or administrative actions to mitigate pollution by the factories need to be crafted to suit the characteristics of rubber and oil palm. The paper concentrates on a North Sumatra study in 2001-2003, but its observations are pertinent to the wider Indonesian scene.

BACKGROUND ON RUBBER AND OIL PALM

The area of 3.32 million hectares under rubber in Indonesia in 2003 largely comprises smallholdings, which, especially in the remote regions including Kalimantan, follow the Swidden system of agriculture (IRSG, 2003). Thus, 70% of the rubber produced comes from smallholder cultivation (Statistik Direktorat Jenderal Perkebunan, 1998). The farmers concerned largely cultivate old, low productive clones planted during an initial period of annual cash cropping. The latex is converted into poor quality coagulated slabs or *bokar*, floated down river for processing in CRFs. The smallholding component of the 340 504 ha of rubber in North Sumatra in 2003 is more intensively managed, with its output generally converted into standard Indonesian rubber (SIR).

The area of 4.9 million hectares under oil palm in Indonesia in 2003 is partly under estates and partly under smallholdings, with some of the latter being in *nucleus estate plasma* financed through special government loans. While oil palm is cultivated in 16 provinces, developers have concentrated on western Indonesia, particularly North Sumatra which has 229 978 ha of the crop (BPS, 2003). The production of fresh fruit bunches (FFB) by oil palm estates and smallholdings are all processed in palm oil mills. There were 242 such mills in Indonesia in 2004, of which 82 were in North Sumatra (IOPRI, 2001).

Rubber and oil palm contribute significantly to the Indonesian economy, accounting for 2.5% of GDP in 2003, and with palm oil being the largest revenue earner amongst the plantations. The two crops employ over three million persons, including both labourers and small farmers, and contribute significantly to poverty alleviation. The government continues to encourage domestic and foreign investment in oil palm, especially inviting investors to expand cultivation in eastern Indonesia where large areas of forest are available for exploitation.

IMPACTS ON THE ENVIRONMENT

The development of rubber and oil palm in Indonesia has led to an accumulation of effluent in streams and rivers, seriously lowering the quality of life of local communities which fresh water is from rivers and streams.

Rubber

The authors in October, 2001 visited a CRF just 20 min from Medan, the capital of North Sumatra. This factory, which had operated alongside the main highway for more than 30 years, consisted of a large brown building of rusted steel roofing. The wind carried a strong odour of coagulated

rubber, coming predominantly from wet unprocessed *bokar* being sorted, cleaned and separated from the waste. The waste treatment system behind the factory consisted of a grate designed to catch small pieces of rubber carried by the effluent. The effluent then flowed into swampy land behind the factory, and from there into the river.

To understand the pollution problem, it is important to analyse wider farming and production practices. First, in regard to estates, large plantations have their own latex concentrate and ribbed smoked sheet processing factories. In these factories, mishandling of chemicals affects waterways, leading to fish toxicity and other problems of human health. In 1993, the Director-General of Estate Crops surveyed large plantations in Indonesia, showing that only 22 rubber factories out of 139 employed treatment systems. No factories had reached the national standard for wastewater effluent (Zen, 1999) and the situation does not appear to have changed much subsequently up to 2003. Estate factories produce less than 20% of Indonesia's rubber exports, however, and most problems come from smallholder CRFs.

In regard to rubber smallholdings, the production process is tied to the social and economic situation of those concerned, with a complex set of incentives driving farmers to produce low quality dirty rubber (Zen, 1999). Smallholders sell rubber to intermediate traders who, since they act as both buyers of raw rubber and local financial patrons, are sources of economic security. Given the lack of strong cooperatives and associations, smallholders have a low bargaining power vis-à-vis such as traders, and obtain low prices. The intermediate traders sell to other traders, who are the agents of the crumb rubber factories.

Within this system, there is no standardization of pre-processed rubber products, and in the absence of an effective quality control system at the point of purchase, traders buy *bokar* based on weight, without consideration of quality. Consequently, farmers have a large incentive to add contaminants such as soil, sand, leaves, bark shavings and rattan rope, all of which make coagulated slabs heavier and help them earn a higher price. The situation is worsened by farmers' use of unsuitable coagulants, such as sulphuric acid, triple superphosphate, raw pineapple and *gadung* (*Discorea* sp.). These coagulants are cheaper and easier to secure than the recommended formic acid, and help retain moisture in the thick slabs. Most smallholder rubber consequently has a dry rubber content of 40%-60%, with the balance of the slab comprising moisture and wastes added during processing (Zen, 1999).

CRFs use a lengthy cleaning and milling process to deal with contaminants, and even blend processed dirty rubber with clean rubber to reach the lowest of the Standard Indonesian Rubber grades (SIR 20). This process needs a lot of water, and hence, creates large amounts of liquid and solid waste. This is why almost all CRFs associated with smallholders are situated along rivers.

The rubber in the waste together with substances added during processing form an excellent medium for proliferation of microorganisms, generating a high biological oxygen demand (BOD) and bad odour. River water containing such untreated effluent waste undergoes a change in its natural composition, as any naturally present oxygen is rapidly depleted (Zen, 1999).

Effective treatment of rubber factory effluent requires extensive ponds, the use of anaerobic bacteria, and an aerator to reduce the BOD. Such ponds need considerable space and expenditure, while an aerator costs at least one billion rupiah. In fact, the daily pollution load created by all kinds of rubber processing nationally is equivalent to the waste generated by 1 930 320 people, according to the BOD parameter (Zen, 1999). Interviews with local government officials in North Sumatra indicated that while the CRFs owned by state plantation companies generally have ponds, the waste generally bypasses them without effective sedimentation. Other CRFs in North Sumatra, and especially those associated with smallholders, have not built ponds, and their effluent goes directly into nearby streams.

Rubber factories also generate air pollution, which again leads to community complaints. Thus, one local government official interviewed in the course of research observed that when he visited a CRF, the smell was so bad that he felt nauseous. Air pollution originates from the drying process, the storage of unrefined rubber and organically overloaded treatment lagoons. The worst odour comes from latex concentrate caused by volatile fatty acids produced during the breakdown of organic matter by microorganisms, but factories producing RSS also create pollution through smoke (Zen, 1999). No effective minimization of air pollution has been conducted by the RSS factories in North Sumatra so far.

Oil Palm

The visitor driving across North Sumatra can see palm oil mill (POM) chimneys belching smoke into the air, with clouds of smoke and dust hanging over large sections of the trans-Sumatra highway. When we visited a village beside a POM near Tebing Tinggi, an acrid pall of smoke hung over the area. This mill had a capacity

of 30 t FFB/ hr, harvested from six neighbouring plantations and some smallholder blocks. An old man we met described how the POM worked 24 hr a day. At night smoke hung over the area, and often he felt giddy (*pening*) from the fumes. In the dry season, effluent would dry out and lie stagnant in the channels, with swarms of flies and a rotten smell pervading the village. During the dry season, this man often had persistent flu-like symptoms. But according to him, the company employed the village head and many villagers in the factory, hence, ensuring the community took a submissive view. He confessed that people felt intimidated, and asked us not to mention his name.

A POM with a capacity of 60 t FFB/hr produces 1200 m^3/day liquid waste, this is not liquid waste, so not necessary to exclude. This is equivalent to a pollution load of 15 000 kg BOD/day, amounting to the sewage produced by a city of 75 000 people (Pamin *et al*., 1999). Indonesia's 204 POMs in 1998 had a capacity of 8074 t FFB/hr (Ditjenbun, 1998), and the estimated amounts of their waste are shown in *Table 1*. There are now 82 Palm POM operating in North Sumatra.

The processing of oil palm fruit also creates large amounts of solid waste, including empty fruit bunches (EFB), mesocarp fibre and fruit shell. Big plantations usually choose to burn this waste rather than utilize it, leading to noxious odours and smoke pollution over large areas. While some PTPN employ the shell in making plantation roads, most factories burn it for their boilers. This too produces much black smoke and dust, especially in old plants.

TABLE 1. TYPES AND OUTPUT OF WASTE GENERATED BY IN INDONESIA, 1998

Waste	Output per tonne FFB	Waste from 204 POM
Waste water (m^3)	1	32 000 000
Empty fruit bunch (EFB) (t)	0.2 (wet)	6 400 000
Mesocarp fibre (t)	0.13 (dry)	3 960 000
Shell (t)	0.5 (dry)	1 600 000
Trunk (tree) (t)	70	850 000
Palm oil mills (dry/ha/25 yr)		

Source: Pamin *et al.* (1999).

POLICIES TO CONTROL POLLUTION

Indonesian policy makers have primarily relied on traditional forms of bureaucratic regulation, sometimes known as *command and control* approaches. Policy makers have generated many laws, regulations and policy statements relating to pollution control, forming a comprehensive framework meant to guide agencies and officials at all levels. The framework involves statements backed by the government that grant permission, prohibit, or require action under designated circumstances (Scheneider and Ingram, 1990). It sets conditions for obtaining licenses, and prescribes standards for operating industries, with these being backed by monitoring and sanctions for non-compliance.

For some time, environmental policy makers in Indonesia and elsewhere have recognized the inadequacy of giving responsibility to sectoral agencies for *end of pipe* solutions to pollution problems. Their emphasis has moved to integrative, cross-sectoral approaches that anticipate and prevent environmental damage by combining environmental policy with economic, trade, energy and agricultural policy (Eckersley, 1995). To this end, the government created the national agency, *Bappedal*, to coordinate environmental policy and ensure pollution mitigation was not just a sectoral agency issue.

Spatial Planning and Environmental Impact Assessment

In theory, environmental problems can be avoided if environmental principles are applied at the planning stage. For instance, effective spatial planning will avoid unnecessary environmental impacts by ensuring industries are sited in appropriate places. When CRFs in Tebing Tinggi, near Medan, opened over 30 years ago, for example, they were distant from residential areas. However, the city has now extended into the adjacent hinterland, and residences now surround the previously insolated factories. If spatial planning principles had been applied, the industrial and residential areas would still be separate.

Again, undertaking environmental impact assessments prior to development of an industry or enterprise can in theory anticipate environmental problems allow planning to minimize them. Government legislation since 1996 has provided detailed guidance for such environmental impact assessments, commonly known as AMDAL. Any new development project expected to have significant environmental effects should conduct an AMDAL at the planning stage, when this involves blueprints designating how to handle and minimize waste for the whole lifecycle of the factory. Industries whose proposed activities are deemed to have an insignificant impact on the

environment, on the other hand, need only provide environmental management and environmental monitoring documents. These should be in accordance with the provisions specified in their permits.

Prior to 1999, every sectoral department and non-department government agency and local government had responsibility for establishing an AMDAL Commission to review AMDAL applications for new enterprises. This meant that in each instance 14 central government departments and other agencies had responsibility for implementing the AMDAL process, with each unit governed by many different regulations. In 1999, in an attempt to simplify procedures, the central government promulgated PP 27/99, which grants districts/municipalities the key responsibilities for evaluating AMDAL.

After regional autonomy was established in the early 2000s, the chain of responsibility for AMDAL altered again. If the environmental impacts potentially concern more than one district or *kabupaten*, the AMDAL commission is coordinated at the provincial level, but if the potential impacts are limited to a *kabupaten*, the commission is coordinated at that level. Large projects with national implications have their commissions coordinated by the national government. The final decision for issuing an AMDAL rests with the relevant sectoral minister and local government, which local official responsible is either the provincial governor or head of the district government, known as the *Bupati*.

Most of the CRFs in North Sumatra had already been established by the 1970s, and had thus operated for some time before the first AMDAL regulation was passed in 1986. Industries already in operation had, instead of an AMDAL, to undergo an environmental impact assessment, which came to be called DPL (*Dokumen Pengelolaan Lingkungan*). But in practice, the CRFs and other factories producing centrifuged latex and ribbed smoked sheet were able to put off observing this regulation. The majority of CRFs are located on the banks of rivers and in the middle of communities. There are, for instance, three CRFs in Medan, and three more in Tebing Tinggi.

The CRFs argued they would be forced to close if the regulations were applied, since they lacked space for developing waste water plants, and would have to move to satisfy the regulations. They also claimed that they lacked capital to develop effective environmental management facilities. They asserted that because they were labour-intensive, their closure would effect large numbers of people. Consequently, the government never properly applied DPL to them.

Although some POMs in North Sumatra already existed before 1986, most only came into operation subsequently and hence had to apply for an AMDAL. However, the consequent purported application of AMDAL regulations did not mitigate pollution problems. This was basically because the AMDAL commissions failed to operate effectively, often employing people lacking the required knowledge and principally interested in furthering their careers. The NGOs and community representatives tended to be selected from compliant (*plat merah*) groups, meaning the commissions were dominated by the government. It is a open secret among officials of the Environmental Impact Management Agency (*Bapedalda*) at provincial and district levels, the provincial and district equivalents of Bappedal, whose primary function is making recommendations over follow-up actions to the head of its region, that *independent* consultants and AMDAL commission members are typically paid by factory interests to ensure the needed results. Moreover, AMDAL commissions are only temporarily concerned, and after a permit is granted do not implement the plans to minimize waste.

AMDAL reports accordingly appear as mere formalities to fulfil as license requirements set by government. Indeed, a comparison of AMDAL documents produced by commissions for different factories demonstrates many to be almost the same, despite the entirely different environmental characteristics of locations. In fact, consultants writing AMDALs have been known to forget to change the name of the factory on the document they are using as a template. Given that the documents are ineffective in their requirements to prevent pollution, environmental inspectors can do little to rectify the situations. They are given the innocuous environmental impact documents by factory operators, and these - supplemented by further appropriate payments — enable the status quo to be maintained.

Ongoing Monitoring and Sanctions

Once a factory has obtained a license, it has to operate within prescribed standards for air, water and noise pollution, odour levels and land degradation. The laws setting out these standards aim to forestall the emergence of environment problems, providing penalties for industries that fail to comply. While Bapedelda has a key role in making recommendations on licensing through the AMDAL process, the power to rescind operating licenses is with the sectoral agencies issuing them. Thus the primary responsibility for monitoring rubber and palm oil plantations and latex factories is with the *Dinas Perkebunan* (local office of the tree crops advisory unit), while responsibility for the POMs and CRFs is with the *Dinas*

Perindustrian (local office of the industry advisory unit).

But since environmental issues are cross-sectoral, dealing with the environment requires a wider sphere of coordination. Here, Bapedelda also has jurisdiction over pollution problems outside the factory premises, which gives it somewhat more scope. Thus, when a pollution problem arises, Bapedalda can, after three warnings, recommend and take away the factory waste treatment rights by, for instance, shutting down the factory's effluent pipes.

Key Obstacles

Thus, although the Indonesian Government has developed a comprehensive legal framework for pollution control, state agencies have largely failed to ensure effective compliance. This is indicated by the reality that no rubber factory or POM in Indonesia has ever been shut down for infringing the relevant laws. The key problems facing bureaucratic regulation are now addressed.

A deficient legal system. The system is beset with problems affecting the ability of pollution victims to pursue justice through civil litigation. It is extremely expensive to use, and access to the courts is a big problem for the poor people most affected by pollution. There is also the difficulty of providing consistent scientific evidence, and cases often fail due to the paucity and inconsistency of evidence. One official of the *Dinas Perindustrian* noted that a case failed because the government agency concerned could not prove that the pollution was from a particular factory, rather than the other factories upstream. There had additionally been failure to follow strict legal protocols in gathering evidence.

To overcome such difficulties, Law 27 introduced in 1997 denotes that the burden of proof should lie with the company responsible for the waste, rather than with people suffering its impact. Unfortunately, however, there are no implementing regulations, and the principle has never been operationalized. Unless the affected communities bring direct pressure on the factories, for example, through popular demonstrations, they must depend on sympathetic officials acting through the pertinent administrative law.

Corruption. Collusion, corruption and nepotism or KKN are pervasive in Indonesia. The implementation of regulations characteristically depends on low-level officials from regulatory agencies. Such officials at the *shop floor* level need to cooperate closely with the industry, and, over time, develop close relations with their *clientele*, negotiating compliance rather than strictly enforcing the law. They and their industry clients may come to arrangements involving exchanges of money and favours, meaning that the government agencies are *captured* by the industry interests in a significant obstacle to law enforcement. Although collusive relations can be subtle, they are often blatant. The authors heard several unconfirmed allegations of how senior staff from provincial and district/municipal governments overtly took bribes and misused public funds.

The operators of one factory described how Bapedelda officials coming to the factory asked for *sample costs* (*wang sampel*), which, although usually amounting to Rp 150 000 per sample, could rise to Rp 0.5 to Rp 2 million per visit if dining and transportation charges were also included. The fact that several officials visited together much raised the total expenditure. The operators felt such fees were arbitrary, and there is no doubt that behaviour of this kind undermined the professional standing of the inspectors. The operators also alleged that when, on one occasion, they exchanged a sample with mineral water the reported result was the same as the year before. They concluded that officials *just tick the box, and write a report*, in this way avoiding the laboratory costs.

It was also noted by a *Dinas Perkebunan* official that staff wishing to inspect factories did not have automatic access, needing to ask permission from managers before monitoring the pollution. Managers can refuse access, or delay it to a time convenient for them. Such dependence can make it difficult for inspectors to recommend harsh actions.

These patterns of behaviour make the locals cynical about the government efforts to mitigate pollution. A local resident living next to a CRF which had bothered the locals with a pungent smell said, "don't bother complaining. It's a waste of time, for if the officials come they are taken to the company office and that is the end of the matter. They don't look behind the factory, just take a payment". Residents don't believe that the government is serious about pollution issues, and many can't be bothered to report problems. Corruption erodes respect for the government officials, undermines monitoring, and weakens implementation of the environmental laws.

Lack of political commitment and worker support. Governments usually lack commitment to deal with pollution, wishing to avoid policies that may affect the competitiveness of industry and cause political problems for themselves. Again, polluting industries create many jobs, and interviews with workers dependent

on the CRFs and POMs for their livelihoods showed that they were not prepared to oppose their factories despite the significant environmental problems.

If the government acts against a factory, the factory can mobilize its staff to sign petitions and demonstrate outside the official offices. Again, the rubber and palm oil industries have made considerable investments, and the factory owners usually have financial and political connections to the government which thus has an interest in their continued profitability. This creates political problems for the agencies wishing to apply sanctions. The government is as well eager to attract new industries, and afraid to discourage investors in any way. Such considerations mean that the government agencies are reluctant to act against factories, even though the law provides for appropriate sanctions.

Lack of credibility. Where sanctions are poorly enforced, the regulators lose their ability to coerce factories into meeting standards. The factories do not comply either because they believe they won't be caught or because it is cheaper to bribe the inspectors which is cheaper than investing in pollution control.

The factories perceive a lack of commitment from the government, hardly even feeling obliged to follow *soft* approaches when the agencies attempt to enforce pollution control. Once, the *Dinas Perindustrian* in Medan organized a course on how to minimize pollution, and invited the factory owners to attend. But the owners just sent their *satpam* (security men), so that the *Dinas* was not offended. This showed that the owners believed that the agency was not serious about dealing with pollution problems. The government clearly needs to apply effective regulatory instruments to compel the companies to invest in pollution mitigation, and reorganizing its departments to ensure such outcomes is a very significant step towards this end.

Reluctance to invest in pollution mitigation. A financier investing in a POM without proper waste water treatment facilities will generally retrieve his capital in two to three years, and earn significant profits thereafter. Given their high volume of liquid waste, POMs require large treatment facilities, involving considerable investment. One engineer indicated that cleaner production incorporating such facilities reduces waste water but also lowers the palm oil extraction efficiency. He said of his own factory that "management is economical (*hemat*), they consider investing in the technology for better waste management as extravagant, while from our perspective (that of an engineer) it would increase efficiency." Companies tend to see waste treatment as an external cost which they do not wish to internalize. Technology reducing smoke emissions from POM is also available, but this too is considered too expensive, especially since it does not add economic value to production.

The same engineer indicated that waste treatment demands careful management. If one pump fails, the whole system will break down with untreated wastes flowing into the river. It is true that to minimize costs the waste treatment facilities POMs do construct are usually poorly maintained. Hence, sludge accumulates where it should be removed, and this leads to an overflow of raw liquid waste into the river.

CRFs are also highly profitable enterprises, as indicated by their ability to operate way below capacity. One official in the municipality of Tebing Tinggi estimated that a CRF would have to spend Rp1.8 billion to build an effective waste treatment facility, or 50% of its profits for three years. The CRFs are also reluctant to invest in water treatment plants when the price of rubber is low. Investing in the technology, maintaining the treatment plants, and buying chemicals will increase the operational costs, making them less competitive.

Problems of Decentralization

Although Indonesia has a long history of decentralization, the previous decentralization laws under the New Order amounted to *deconcentration* (Niessen, 1999). In contrast, the new Law (No. 22/1999) aimed to delegate key decision-making powers to the district and municipality administrations which will be accountable to their local constituencies. This approach is consistent with *democratic decentralization* entailing the devolution of powers and resources to lower-level authorities, which are, to varying degrees, independent of higher levels of government and responsible to their local populations (Agrawal, 1999; Manor, 1999).

In Indonesia, the framework decentralisation law (UU No. 22/1999) specifies that 14 areas of government activity - including management of the environment - are to become the primary responsibility of the autonomous districts/municipalities. The law works on the assumption that districts and municipal governments attain extensive discretionary powers while the central government only retains the powers over setting policy, guidelines and standards. In effect, the district and municipal governments now have most responsibilities for environmental

management and monitoring. The provincial Bapedalda is now responsible merely for environmental problems with impacts across more than one district (see PP No. 25 of 2000). The decentralization law (UU 22/1999) gives district governments responsibility for environmental issues. In North Sumatra, this has led to four out of 19 districts developing Bapedalda at the kabupaten level.

This delegation of authority to district offices offers advantages. After the original establishment of Bapedalda at the provincial level in 1998, this agency faced significant problems carrying out its mandate. With a staff of 25 and a budget of only 500 million rupiah, the agency from its office in Medan was responsible for monitoring over 1000 factories spread across North Sumatra. At the same time, the provincial *Dinas Perkebunan* in North Sumatra had only four people responsible for monitoring 84 POMs in the whole of North Sumatra. Now, after regional autonomy, each district will in time have staff dedicated to environmental problems. The district government will be able to make direct decisions in the community interest without working through a long bureaucracy to secure directions from above.

But several problems have emerged during the transition to regional autonomy, and these are as follows:

- lack of clarity in functions. Interviews with officials at district and provincial levels indicate that the areas of authority of different agencies are unclear. Thus, provincial agencies have not given up monitoring functions, and factories complain they receive visits from both provincial and district agencies as well as from the regional legislative assembly or DPRD. They do not know to whom they are responsible by law. This is partly because much sectoral legislation has not been brought into line with the new law.

  In the meantime, districts and municipalities have set up legislative regimes for issuing permits, imposing levies on activities such as handling of waste, and bringing pressure on companies to act in accordance with the new by-laws. There is controversy here as well, because many levies duplicate state taxes (SMERU, 2001).

- insufficient status of officials and inappropriate delegation. In some cases, district and municipal governments have given responsibility for environmental protection functions to officials with insufficient status. It is, as already indicated, not possible for Bapedalda to work effectively without coordinating with the chief executive in the region and with other agencies.

  Unfortunately, many district/municipal governments either do not understand this or feel that environmental issues are unimportant. But the low-level officials they accordingly appoint are unable to coordinate their activities with other agency heads possessing higher *echelon* status. Thus, a survey in 2002 of districts and municipalities in North Sumatra revealed that only 10 of 19 districts/municipalities had appointed environmental personnel with the appropriate echelon status in the sense described (Report of Expert Team for Bapedalda North Sumatra, 2002).

  In other cases, district governments have delegated environmental responsibility to inappropriate agencies with different priorities, leading to conflicts of interest. In four districts of North Sumatra, environmental functions have been respectively delegated to officials in the planning agency, the capital investment body, the district mining and energy authority, and the department responsible for sanitation, parks and cemeteries. These other *Dinas* are often production-orientated within their own spheres, and, even if they tackle environmental aspects, end up dealing with a narrow set of problems such as treating waste.

- lack of capacity of officials. District and municipal governments are often incapable to provide the proper resources and qualified staff to the new local agencies. Despite training programmes, the capacity of staff to carry out investigations is still weak. Hence, a survey of 19 kabupaten and cities in North Sumatra found that only 38 out of 208 officers carrying out environmental functions had training in environmental matters, such as carrying out AMDAL, environmental audits or routine management (Report of Expert Team for Bapedalda North Sumatra, 2002).

Local governments may also appoint officials to management positions for political reasons, or after receiving payments, rather than because the persons have the

right background including leadership capacity. When the Binjai municipality government created a Bapedelda office, it appointed the former head of the social political office to manage other officials, despite their considerable environmental training. An associated problem is that the districts and municipalities routinely rotate agency heads. The heads consequently do not wish to be too identified with their positions, for fear of having to take actions which might offend their *Dinas* colleagues.

- inadequate finance. Funding presents an exacting challenge for many districts, partly because allocations from the central government under the new regional autonomy formula have affected the division of finance (SMERU, 2001). Bapedalda in districts/ municipalities often lack the necessary funds for projects or programmes, and even have insufficient money for salaries. Hence, the head of Bapedalda in the district of Deli-Serdang said that for the 2001 financial year the budget was Rp 340 million, but because the district had only allocated Rp 15 million which did not even meet the wages. Yet, the agency still had to function, and he had helped the administration develop new regulations, including those levying pollution charges on the 11 POMs in the district.

The same head indicated that these pollution charges were to be used for funding the routine activities of his office. Indeed, some environmental economists have recommended a pollution tax as an incentive to reach certain politically agreed standards set by the government (Eckersley, 1995). But the problem in this case was that the payment levied was based on the size of the industry rather than the amount of waste produced, and there was no incentive for the factory to reduce its pollution loads. Moreover, the district government seemed more interested in raising revenue than waste mitigation. According to officials of *Gapindo* (Indonesian rubber processors' and traders' association), those implementing the regulation merely came to factories and asked for payment without making efforts to help improve the management.

- accountability of elected officials. Commissions from the DPRD empowered under regional autonomy also frequently visit factories *in the name of the people*, but in fact are not very accountable to the latter. One source alleged that 15 people from the assembly in Deli-Serdang visited a rubber factory, which had to pay Rp100 000 per visitor. Moreover, the assembly members lacked a clear reason for their visit, merely saying "we are the people's representative, and need to know in case people ask". Another source declared that DPRD members work with journalists who expose a pollution case, subsequently visiting factories ostensibly to investigate but actually merely to extract payments. "This is no different from the policeman standing at the corner and demanding payments from traffic violators." The DPRD members were barely concerned with improving the management for poor riverside communities suffering the effects of river pollution, especially in the dry season. McCarthy (2004) has addressed the important issue of holding elected regional assembly members accountable to their pollution constituents.

It is clear too that DPRD members carefully balance local business interests against complaints from local pollution victims, with their responses indicating how they interpret accountability. Thus, a member of the DPRD in Deli-Serdang described how people living beside a POM complained to him about skin infections after bathing in the river, also protesting that waste from the factory had killed fish. "As it was in my area, the people came to me. I had to negotiate with the community, visiting them several times. We discussed the case in a session of the legislature, but the company threatened to move out of the district if we took strong action. It said it cost so much to fix the problem. We were afraid all these people would lose their jobs, so we merely said we'd start fixing things. The factory continued to operate, making a few changes. I also asked the company to dig wells, so people no longer needed to wash in the river". In effect, the pollution problem in this case remained unsettled, although the politician handled each side in the manner he judged appropriately.

Finally, concerning decentralization in general, Manor (1999) argued that for it to succeed decentralized authorities should have sufficient powers, resources and administrative capacities to accomplish their objectives, and that accountability mechanisms should ensure that elected politicians are responsible to their local constituencies. But this is manifestly not the case in Indonesia, although it is unrealistic to expect the regional autonomy

reforms to so quickly overcome all problems. As one official noted, "regional autonomy is not a magic drug for all illnesses in the region: it all depends on the circumstances in the region".

CRAFTING BETTER APPROACHES TO MINIMIZING POLLUTION

Given the problems of bureaucratic regulation, policy makers have increasingly turned to other approaches. Here the state may apply *mixed instruments* involving varying levels of official and private action. It may also promote *voluntary instruments* devoid of state involvement. Given the ascendancy of neo-liberal arguments for slimming officialdom and releasing market forces, market-based instruments have become increasingly fashionable (Eckersley, 1995; Aaders). Frustrated by the failure of legal instruments to work on their own, policy makers from the Ministry of the Environment have increasingly focused on social controls and out-of-court settlements. Some alternative approaches to pollution problems are now examined.

Self-Regulation

One example of this in the early 1990s was the Clean River Programme of the Ministry for Environment, which aimed to reduce pollution loads in rivers by 50% in two years. Rubber factories had to sign agreements with local government authorities to comply with the official regulations on waste water effluent standards. But to support this Gapkindo initiated a new Clean Rubber Programme under which CRFs entered into agreements with it to stop purchasing contaminated rubber coagula from smallholders. If any factory failed to comply, Gapkindo would give three written warnings and then request the sectoral agency to cancel the operating license of the non-compliant factory.

This policy was based on the premise that *if no one buys dirty rubber, then no one will produce it*. Raw rubber can only be sold to CRFs and if they refuse to take dirty material, farmers will be forced to only sell clean rubber. Gapkindo supported the programme because eliminating the contamination practices of smallholders would improve the physical and chemical quality of rubber and increase export earnings from the rubber industry.

While the logic of this approach was correct, reality proved more complicated. First, the rubber factories had excess capacity and competed to buy rubber from smallholders. If one factory did not purchase its supplies, another factory would do so. This undermined the demand approach to solving the problem. Second, Gapkindo as an association of processors and traders depended upon CRFs for its funding, and it was not in its interests to shut down non-compliant CRFs. The Clean Rubber Programme also did not tackle the real problem of dirty rubber in the farm production process. The policy failed, and the programme closed in 1996.

Certification

This is a tool enabling the market to select products complying with quality standards, while at the same time offering incentives for industries to meet environmental policy objectives. Certification is meant to guarantee both the process of manufacture and quality of the product itself. Products with International Organization for Standarization (ISO) certification gain wider access to the global market, and companies concerned pay lower insurance premiums.

To obtain ISO certification in the Indonesian rubber and oil palm context, companies must implement an approved environmental management system with ISO 14000. An independent agency is responsible for certification, to avoid any conflict of interest. Since certification depends on the company's commitment to abide by certain rules rather than its actual compliance with compulsory government policies, it is a form of self-regulation.

The ISO 9000 and ISO 14000 certification for rubber requires standardization extending from tapping through transportation, processing and handling wastes to final delivery to consumers. ISO certification for palm oil has similar requirements, and effective implementation requires a coherent management system. Thus, certification is most viable on large estates, where all the activities are controlled by a single management. Experience has shown that in big companies certification can be implemented without significant additional staff.

Effective operation of a certification system depends on proper internal auditing by company staff, and objective external auditing by outsiders. Although both kinds of audit are subject to abuse, the ISO international headquarters is responsible for maintaining standards. Consumers can also benefit from certification, since they obtain more environmentally responsible oil palm and rubber products at a time of greater consciousness of this aspect. But the current certification process does not guarantee that oil palm plantations are not opened from protected forest.

Since smallholder unrefined rubber comes from thousands of little independent growers, it is unlikely to meet ISO standards. To

achieve the latter, CRFs must encourage suppliers to contract to a quality assurance system meeting the ISO 9000 and 14000 requirements. Thus, a partnership between smallholders and factories is the key to creating a clean future production system much enhancing Indonesia's ability to reach global trading standards.

Utilizing Waste in the Oil Palm Industry

Treating all type of wastes from a POM can provide significant benefits for plantations, also reducing the social and environment costs of pollution. There are at least four uses of palm oil waste:

- channeling liquid palm oil mill effluent, or POME, into cultivation areas, in a process of *land application*, increasing the productivity of oil palm while reducing fertilizer use. But this involves high investment costs, and leads to pollution if not carried out carefully and under official monitoring.

- mixing liquid effluent with EFB, producing compost with a very high nutrient content substituting for conventional fertilizers (Schuchardt *et al*., 2001).

- POME processing using an anaerobic system to produce biogas as a substitute for diesel (Schuchardt *et al*., 2001).

- making the shell of oil palm fruits into charcoal, which has a ready market.

However, these technologies are expensive to apply, with the German technology for making compost from effluent and EFB costing two billion rupiah for a 30 t/hr factory capacity. Companies are not keen on this technology due to the expense involved.

Restructuring the Rubber Industry

Another policy alternative involves restructuring *outmoded forms of industrialism* (Eckersley, 1995). Thus, smallholder rubber producers have the basic problem of dirty *bokar*, whose embedded nature means that introducing small-scale clean technology will not work, as shown by the Gapkindo Clean Rubber Programme. A radical approach is to increase the quality and quantity of rubber through replanting old rubber with high yielding clones, and introducing immature period intercrops to improve the farmers' incomes. When the young trees are tapped, good quality production is promoted by introducing mini-machines to produce clean blanket crepe rubber. Such machines under these conditions produce high quality rubber products and increase income. An intervention to secure such transformation would aim to ensure that the rubber produced reaches the market standard quality and gains access to domestic and overseas markets.

But securing the application of new technologies this way requires a dramatic agricultural and social reorganization, necessitating intervention by an NGO or an official project with substantial government support, working with village-level associations and farmer cooperatives. This is a very expensive initiative which has been implemented successfully in some instances, for example, PIR-Ophir in Pasaman, West Sumatra and SRDP in South Sumatra, Riau and West Kalimantan. Yet, owing to short resources, it will hardly be possible on a national scale, and more piecemeal approaches are likely to be more feasible.

CONCLUSION

In this paper, we have discussed the challenges faced by state agencies in exercising environmental control over oil palm and rubber pollution. Despite a legal framework for the control, the civil courts are inaccessible due to the expense and difficulties in presenting evidence.

Pervasive institutional problems derail bureaucratic regulation, while agencies lack authority and must even ask permission to visit the factories being monitored. Corruption, collusion and nepotism are further undermining factors, while the industry effectively *captures* the low-level officials responsible for regulating factories. Local government is also reluctant to impose harsh sanctions on polluting oil palm and rubber factories, since they can mobilize their employees in protest and are substantial payers of taxes. All these problems have reduced the credibility of the bureaucratic apparatus.

While regional autonomy should, in theory, make the implementing environmental agencies more susceptible to the community needs, in practice the responsibilities of most of the decentralized bodies are not clear. In addition, staffs are frequently not competent, transparency and accountability lacking, and insufficient funding provided. Thus, in the absence of effective regulatory deterrence and other controls, the oil palm and rubber industries externalize their environmental costs and avoid investing in pollution control, destroying the health and well-being of the surrounding populations.

To overcome these various difficulties, the areas of responsibil-

ity should be clearly delineated, and authority over environmental affairs in autonomous districts/ muni-cipalities handed to bodies headed by qualified officials with sufficient status and good backup staff. Sufficient funding should be provided to environmental bodies, and proper accountability and transparency established. But achieving all this in the multiplicity of the kabupaten is no easy task, and also involves wider issues such as the setting up of effective local taxation systems.

The state policy-making can also become more creative, with solutions crafted for specific circumstances. Thus, certification through ISO 9000 and ISO 14000 offers incentives for improving the rubber and oil palm production processes and the quality of the final products, while at the same time minimizing the waste produced. Again, the technologies to add value to wastes offer some incentives for pollution control. Unfortunately, the technologies require dealing considerable investment, and may not be tenable for the smaller factories and CRFs with smallholder rubber.

It seems in the broad picture that improvement is easier with the large companies, where the legal instruments are easier to tighten and apply effectively, and certification more easily introduced. In contrast, the problems associated with the CRFs are harder to overcome, with one solution to the deep-rooted problems being blanket interventions to clean up the whole process of small farm production and processing. This will not be feasible in the near future, however, and selective targeted interventions to improve the quality of smallholder products are likely to be more rewarding.

Despite the seemingly intractable problems of mitigating factory pollution, attempts to improve the situation along the lines indicated should certainly be made. Here, bureaucratic regulation and market approaches are not exclusive but mutually supportive, while there is no simple dichotomy between *command and control* and other approaches to improvement (Eckersley, 1995). It is true that eliminating pollution can significantly increase income and improve health, and that these advantages are likely to be helpful in encouraging a positive long-run environmental change.

REFERENCES

AALDERS, M. Self regulation and compliance with environmental law from a global perspective. *Towards Integrated Environmental Law in Indonesia*.

AGRAWAL, A and RIBOT, J C (1999). Accountability in decentralization: a framework with South Asian and African cases. *J. Developing Areas, 33 (Summer 1999)*: 473-502.

ALWY, M (1998). Palm-oil plantation and the World Bank/IMF: its relation and impacts in Indonesia, Latinteractive. Berita.http:// www.latin.or.id/palm_oil.htm

BAPEDAL (1995). Emission standard for stationary sources. *Decree of the state minister for Environment of the Republik of Indonesia No. Kep 13/MENLH/31995*. Jakarta.

CASSON, A (2000). *The Hesitant Boom: Indonesia's Oil Palm Sub-Sector in an Era of Economic Crisis and Political Change*. CIFOR.

DIREKTORAT JENDERAL PERKEBUNAN (1998). *Statistik Perkebunan Indonesia 1997-1999*. Jakarta.

DOWN TO EARTH (1998). Oil palm expands, farmers lose out. *Quarterly Newsletter of the International Campaign for Ecological Justice in Indonesia*.

ECKERSLEY, R (1995). *Markets, the State and the Environment: An Overview. Markets, the State and the Environment: Towards Integration* (Eckersley, R ed.). Macmillan Education Australia, South Melbourne.

GONNER, C (1998). Conflicts and fire causes in a sub-district of Kutai, East-Kalimantan, Indonesia, IFFM.http://www.iffm.or.id/Fire_Causes.html

IFFM/GTZ (1998). Fire in East-Kalimantan in 1998. http://www.iffm.or.id/FiresinEast2.html, IFFM/GTZ.

IRSG (2003). *Rubber Statistic*. International Rubber Study Group. Vol. 58 No. 2 (September).

IOPRI (2000). Cleaner production at oil palm industry. Unpublished report.

KANTOR MENTERI NEGARA LINGKUNGAN HIDUP (1998). *Analisis kebijakan penanggulangan kebakaran hutan dan lahan tahun 1997. Laporan Akhir Posko Kebijakan Lingkungan Hidup*. Jakarta.

MANOR, J (1999). *The Political Economy of Democratic Decentralization*. The World Bank, Washington, D.C.,

MCCARTHY, J F (2004). Changing to gray: decentralization and the emergence of volatile socio-legal configurations in Central Kalimantan, Indonesia. *World Development, 32 (7)*: 1199-1223.

NIESSEN, N (1999). *Municipal Government in Indonesia: Policy, Law and Practice of Decentralization and Urban Spatial Planning*. Leiden University, CNWS Publications.

PAMIN, K; TOBING, P L and DARMOSARKORO, W (1999). *Pemamfaatan limbah cair pabrik kelapa sawit: desain aplikasi dan dampaknya terhadap tanaman kelapa sawit. Lokakarya, Pengendalian Limbah Cair Pabrik Kelapa Sawit dengan Sistem Aplikasi Lahan (Land Application)*, Bapedal Wilayah I Sumatra dan GAPKI.

REPORT OF EXPERT TEAM FOR BAPEDALDA NORTH SUMATRA (2002). *Kajian Eksistensi Bapedalda Kabupaten/ Kota Sumatra Utara Tahun 2001*.

SCHNEIDER, A and INGRAM, H (1990). Behavioural assumptions of policy tools. *J. Politics, 52*: 510-529.

SCHUCHARDT, F; DARNOKO, D; HERAWAN, T; ERWINSYAH and GURITNO, P (2001). Use of empty fruit bunch from oil palm for compost production and waste water drying. Workshop on the Environment of Oil Palm. 19-20 June 2001. Medan

SMERU (2001). Regional autonomy and the business climate: three Kabupaten case studies from North Sumatra. *Field Report*, Jakarta.

WAKKER, E (1999). Forest fires and the expansion of Indonesia's oil-palm plantations. WWF Indonesia, Jakarta.

WRM (1998). Sawit watch: an Indonesian network against oil palm plantations. http://forests.org/gopher/indonesia/policeo.txt

ZEN, Z (1999). *Towards a More Sustainable Natural Rubber Industry in Indonesia: The Special Role of Smallholders. Murdoch University*.