



Economy and Environment Program
for Southeast Asia
22 Cross Street #02-55
South Bridge Court
Singapore 048421

Phone : (65) 6438 7877
Fax : (65) 6438 4844
E-mail : hfrancisco@idrc.org.sg
Web site : www.eepsea.org

The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 9 member countries: Cambodia, China, Indonesia, Laos, Malaysia, Papua New Guinea, the Philippines, Thailand, and Viet Nam. Its goal is to strengthen local capacity for the economic analysis of environmental problems so that researchers can provide sound advice to policymakers.

EEPSEA Policy Briefs summarize the key results and lessons generated by EEPSEA supported research projects, as presented in detail in *EEPSEA Research Reports*.

EEPSEA Policy Briefs and Research Reports are available online at <http://www.eepsea.org>

Can River Sand Mining Be Sustainable? – Policy Options From Sri Lanka

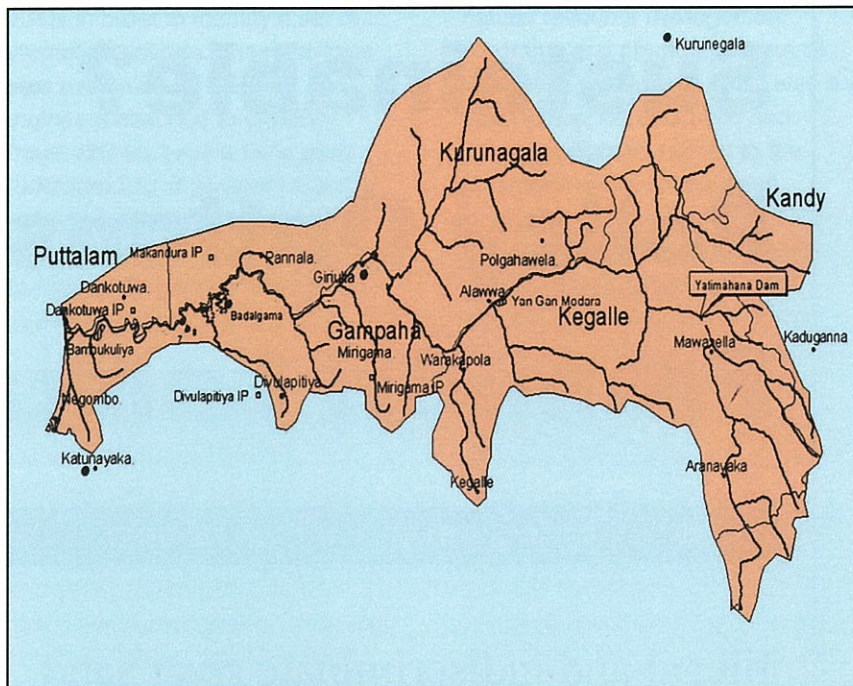
EEPSEA POLICY BRIEF • No. 2010-PB7

Illegal and indiscriminate river sand mining is causing a large number of environmental and social problems in Sri Lanka. To find solutions to these significant challenges, a new EEPSEA study has identified policy options for sustainable river sand mining that minimize environmental degradation while meeting the requirements of industry and local people.

The study is the work of L.H.P. Gunaratne from the University →

A summary of EEPSEA Research Report No. 2010-RR7: 'Policy Options for Sustainable River Sand Mining in Sri Lanka' by Dr. L.H.P. Gunaratne, Department of Agricultural Economics and Business Management, Faculty of Agriculture, University of Peradeniya, Peradeniya 20400, Sri Lanka.
Phone: 94-81-2395506. Fax: 94-81-2395550.
Email: lhpguna@pdn.ac.lk

“Off-shore sand is the ...



The basin of the Ma Oya River

→ of Peradeniya, Sri Lanka. It finds that a number of site-specific management alternatives can reduce the negative impacts of river sand mining. These are: the restriction of mining at vulnerable sites, the establishment of an environmental trust fund to pay for environmental restoration and involving the community in managing this resource. It also finds that using offshore sand is the best way to decrease the environmental pressure on rivers. It outlines various policies to make this happen, including making the use of offshore sand compulsory for large construction projects.

The River Sand Challenge

River sand is an essential raw material for a number of important industries in Sri Lanka and provides jobs for many rural people. In recent years mining activities in the country have expanded dramati-

cally. This growth has been primarily driven by the boom in the construction industry that followed the Asian Tsunami of 2004. The construction industry is currently the main consumer of river sand and accounts for more than 95% of demand.

It is estimated that a third of the sand mining in Sri Lanka is illegal. Such indiscriminate mining has had a negative effect on most of the country's rivers and streams. The problems it causes include the erosion of riverbanks, the lowering of water tables, the intrusion of salt water and damage to vegetation. Of these environmental problems, salt-water intrusion appears to have the most detrimental effect. Off-site effects include the impairment of rural roads and increased coastal erosion.

A lack of any clear regulatory framework has aggravated the environmental problems caused by river sand mining. In addition, sand prices have increased several times over in recent years and this has driven the exploitation of sand into fragile and remote places. This movement of sand mining into marginal areas has not only exacerbated its impact on nature, but has also caused more damage to weak rural roads.

Identifying Sustainable Policy Options

The main objective of Gunaratne's study is to identify appropriate policy options that will minimize the environmental degradation caused by river sand mining while meeting the requirements of stakeholders, including the construction industry and local people who depend on sand mining for their livelihoods. The study uses four separate investigation approaches: first, a comparison of the costs and benefits of mining in selected sites and, second, an assessment of the trade-offs between environmental conservation and sand extraction as perceived by the miners themselves. The study also evaluates management alternatives. Finally, given that rivers alone cannot meet national demand for sand, the study looks at alternative sources of sand and assesses which options would have the least environmental and social impact.

Comparing Costs and Benefits

A field survey was used to get the information needed to compare the private benefits and social costs of sand mining. The survey was conducted at three sites: Doluwa (Central Province), Weragantota

best way to take the pressure off rivers.”

(Central/Uva Province) and Alawwa (North Western Province). The first two sites are located along the Mahaweli River while the third site is adjacent to the Ma Oya River.

The data that was collected on sand mining's negative effects included: the amount of damage it causes to riverbanks, wetlands and other sensitive areas, the amount of soil erosion it causes, the impact it has on farming income and the amount of damage it causes to structures such as bridges and water pumping stations. Other information collected on the costs and benefits of sand mining included: the number of people it employs, costs of operation, prices and revenues.

The study reveals that sand mining can be privately profitable: for example, the total production cost of one site was estimated to be LKR 2,163,893 per month and the gross mining income was found to be LKR 2,600,000 per month. Since there is a positive difference between income and expenditure (LKR 436,107 per month), sand mining is privately profitable at this site. The same finding was observed for the other sites, with net annual private benefits ranging from LKR 5,233,284 to LKR 13,605,120.

When the external costs of mining were calculated, it was found that sand mining's most significant impact was due to the damage it causes to river banks. For example, for Site 2, the net income loss from crops was valued at LKR 596,000, the damage to roads was valued at LKR 3,681,648 and the damage to riverbanks was valued at LKR 4,300,000. To

calculate the total social costs of sand mining, external costs were added to private costs. To calculate the net social benefits, external costs were deducted from net private benefits.

In general, the study shows that sand mining does have a net annual social benefit. This ranged from LKR 1,722,094 to LKR 11,762,120 across the three sites. However, since off-site costs (e.g. coastal erosion) were not included in this assessment, it is likely that these benefits are outweighed by the industry's overall negative social costs. It was observed that although the costs caused by over-mining (such as the costs of restoration work) are borne by government institutions, government income from river sand mining has remained at a very low level.

What the Sand Miners Think

A field survey of 150 miners and mine workers was used to record miners' preferences and perceptions. An assessment of their views was undertaken to help develop realistic solutions that actually reflect the reality of the communities that are causing the problems. Miners accept that the present regulations are either weak or

inefficient. They also perceive that strict regulations result in bureaucratic inefficiency.

The field survey shows that miners place the highest priority on continuing to mine at their current levels, even if this means that they have to pay a larger royalty payment to the Geological Survey and Mines Bureau (GSMB). It is clear that they would also be willing to contribute to an environmental trust fund, which could be used to mitigate the environmental damage they cause.

Miners are not concerned about sustainability due to a lack of other livelihood opportunities. They are also not in favour of being fully managed by Community Based Organizations (CBOs). Instead they would prefer a co-management arrangement involving CBOs and local government. According to the miners, strict rules, regulations and awareness programs, as suggested by the media and environment groups, would not be productive.

Sustainable Management Options

Alternative management options for sustainable sand mining in three major rivers were evaluated. The rivers were the Ma Oya, the

Alternatives to sand mining

Type of sand	Annual availability (approx.)
Off-shore sand	31.5 million cu.m
Land-based sand	9.6 million cu.m
Dune sand	0.3 million cu.m.
Quarry dust	9.96 million cu.m

Source: (Dias et al. 1999)

Mahaweli and the Deduru Oya. All three have a substantial number of controversial mining sites. The information for this analysis was gathered in two stages. First, a survey was mailed to environmental NGOs in order to identify a set of alternative policies. These policies were evaluated by the field engineers attached to GSMB. These officers have a fairly good understanding of present resource extraction activities, government regulations and the ongoing damage to the environment being caused by illegal sand mining.

The management alternatives (existing and proposed) highlighted by the NGO survey were: A complete mining ban; restricting access to vulnerable sites; doing nothing; setting up an environmental trust fund and switching to community-based sand mining. The social, economic, environmental and technical performances of the different management options were assessed and the options were then scored.

Because of the different geological locations and sand extraction plans of the river systems under investigation, it is clear that each would benefit most from a site-specific management approach. The restriction of mining at vulnerable sites would be the best management alternative for the Ma Oya River, where there are more than 70 mining sites. The next best alterna-

tive for this river would be the establishment of an environmental trust fund to help pay for the rehabilitation of the environment. Such a fund could finance other environmental protection and natural resource management programs and promote the use of innovative solutions. It could also be used to support education and training programs related to the protection of the environment.

Community-based management would be the best option for the Mahaweli and Deduru Oya rivers. Under such a system permits would be provided to registered community-based organizations whose membership would comprise existing river sand extractors. These community-based organizations would be assigned single extraction rights for specified extraction zones in those rivers for which harvest limits are introduced.

Getting Sand from Alternative Sources

As already mentioned, if the demand for sand could be partly met from other sources the environmental impact of river sand mining could be significantly reduced. To see whether this is a possible course of action, alternatives to river sand mining were identified and assessed. The following alternative sources were highlighted: offshore sand, land-based sand, dune sand and the use of quarry dust.

Using offshore sand was found to be the best alternative to river sand mining. In Sri Lanka, the construction industry in Western Province is responsible for 40% of the total sand demand. If this river sand were to be replaced by a reasonable amount of offshore sand, then the immediate pressures on rivers could be mitigated. However, at present, the price of offshore sand is slightly higher than that of river sand and it is less popular because there is the possibility that shells and chlorides are present in it.

Action is therefore needed to move the construction industry towards the use of offshore sand. To do this the existing Mines and Minerals Act should be amended so that the use of offshore sand is compulsory for large construction projects and land filling. A river sand tax could also be introduced in order to encourage the construction industry to move towards the use of offshore sand. Currently sand mining is neither taxed nor charged in line with its detrimental environmental costs. Such a river sand tax should make offshore sand cheaper than river sand and so encourage industry to take a more environmentally-friendly approach.

EEPSEA is administered by Canada's
International Development Research Centre (IDRC) on behalf of EEPSEA's sponsors:



Canadian International
Development Agency

Agence canadienne de
développement international

