

DEBRIS AS A CONSTRUCTION MATERIAL

The Environmental and Economic Benefits



It is estimated that there is some 15-20 million cubic meters of debris from the buildings that collapsed during the January 12th Earthquake in Haiti. Some of this will have to be removed quickly to stockpiles because of hazard, social or reconstruction reasons. Other sites can have the debris processed gradually into building materials such as sand and gravel for use on site. This approach will not only eliminate or minimize the cost of debris removal from sites but also will provide much needed construction material for certain requirements of the rebuilding process, while providing work for thousands of effected people in the form of cash-for-work or small enterprise. It will also preserve the road network, which in its current fragile situation, combined with traffic loads, cannot carry heavy vehicles efficiently.

The Environment

The environment of Haiti was in a highly threatened state even before the January 12th earthquake. The country has only 2-3% coverage of primary vegetation, many of the hill slopes are dangerously exposed or eroded, and the rivers and streams are highly polluted and relentlessly exploited for sand and gravel. The post earthquake scenario will further complicate the already precarious state of the environment by increased pressure on land and natural resources. One of the main challenges will be coping with the increased demand for building materials, especially sand and gravel.



2-3 million cubic meters of sand and gravel per year are currently produced from weathered rock on mountain slopes and river sediment. About 75% of this volume is produced and consumed in the Port au Prince area. Mountain slopes in Port au Prince are patch

worked with scars where they were cut to mine sand and gravel. The streams are extensively dredged for bed material, causing further deepening and acute bank erosion. This situation will only worsen with the exponential increase in material demand to put up the proposed 135,000 transitional shelters and ultimately reconstruct 200,000-300,000 buildings that were damaged during the earthquake. Recycling of debris as construction material would effectively relieve part of this pressure on already dwindling natural resources.

Socio Economic Situation

Given that the earthquake has exacerbated what was already a chronic unemployment situation, the removal and processing of the debris has the potential to employ tens of thousands of people. The use of labour intensive

methods where possible, if supported by donors, could go a long way towards making many families self-supporting.

The Potential of Enterprise Development in the Processing of Debris (Either as Cash for Work or Micro Enterprise projects)

Depending on the business model chosen, some or all of the following services need to be provided as back-up to debris processing.

1. Training
2. Supervision
3. Marketing and Coordination
4. Finance

NGO's that wish to clear sites and make use of the debris have the choice of at least two work structures.

- Cash for work programs where each participant receives a fixed wage and the NGO offsets the set-up costs by producing building products for the T-shelters. In this model capital costs are covered by the NGO.
- Small-enterprise schemes where finance and training is provided by the NGO or partners, and the building products are owned by the entrepreneur. That NGO, or others, could arrange the purchase of materials according to needs.



The viability of these enterprises will depend on the product finding a ready cash market and NGOs should look to expedite this process.

What could be possible?

Small scale debris processing has the advantage of providing a clean product by excluding contaminants by hand selecting what is crushed. Value-adding enterprises, using the aggregate/sand produced, could provide further

building products such as blocks, pressed bricks, gabions and formed concrete products.

Much of the work is 'unskilled' and, as such, offers employment opportunities to many of the poorest. The value of the debris should be viewed as not only the source of a building product, but most importantly as an opportunity to provide work for many thousands of otherwise destitute citizens.

It is anticipated that the processing will be self-funding (i.e wages, capital and running costs will be covered by the sale of the product). But if small subsidies are required, this will not invalidate the project. This is because the alternative of trucking to dumpsites is entirely subsidized, as well as there being no compensating end product.

Capital Equipment and Output.

Small hand operated rock crushers are manufactured by several producers across world. They sell ex-works for US\$2000-2500. An electric powered model is available for around US\$6000. Small hand operated trommel screens can be made locally to the dimensions required. They can be fitted with mesh screens of various apertures to produce a product of uniform size.

Other small powered and mobile jaw crushers of more sophisticated design (and hence more sophisticated maintenance requirements) are available at considerably higher prices, but with compensatingly higher outputs.

The output of the crushers are a function of the type of material being crushed and the size of the final product required. Concrete blocks and aggregate are comparatively easily crushed, and New Dawn hand crushers should have an output of 2 cubic metres plus per day, while their powered machines are probably double this for the same workforce. The more sophisticated machines can produce these quantities per hour, if they can be fed at that rate.

Most sand and gravel products cost between \$25 and \$30 per cubic metre delivered, depending on location. While pilot projects have not been run on debris sites, it is anticipated that a work force of 5 or 6 will be required to operate and feed each crusher and screen the product. This would provide a work crew with wages, plus a return on capital. As stated earlier, should small subsidies be necessary at difficult sites, this would in no way invalidate the project. The alternative is to transport the material to dumpsites, at a subsidy of something like \$80 per cubic metre.