



United Nations Development Programme

Tsunami Recovery Waste Management Programme

Independent Assessment and Evaluation

Project Completion

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ACRONYMS AND ABBREVIATIONS

AGTP	Aceh Government Transformation Programme
APBK	<i>Anggaran Pendapatan dan Belanja Kebersihan</i> (Sanitation Department budget)
Austcare	Australians Caring for Refugees (now ActionAid Australia)
Bappeda	<i>Badan Perencanaan Pembangunan Daerah</i> (Regional Development Planning Agency)
Bappenas	<i>Badan Perencanaan Pembangunan Nasional</i> (National Development Planning Agency)
BOD	Biological Oxygen Demand
BRR	<i>Badan Rehabilitasi dan Rekonstruksi</i> (Rehabilitation and Reconstruction Agency)
DKP	<i>Dinas Kebersihan dan Pertamanan</i> (Department of Sanitation and Parks)
DK3	<i>Dinas Kebersihan dan Keindahan Kota</i> (City Sanitation and Beautification)
ERTR	Emergency Response and Transitional Recovery Programme
IRFF	Infrastructure Reconstruction Financing Facility
LOA	Letter of Agreement
MDF	Multi Donor Fund for Aceh and Nias
MSW	Municipal solid waste
NCE	No cost extension
NGO	Non-governmental organisation
PET	Polyethylene terephthalate
PMEU	Planning, Monitoring and Evaluation Unit
RPH	Riley Park Hayden & Associates
RPJMN	<i>Rencana Pembangunan Jangka Menengah Nasional</i> (National Mid-Term Development Plan)
SD	<i>Sekolah Dasar</i> (Elementary School)

SGB	School Garbage Bank
SMEs	Small and medium enterprises
SWM	Solid Waste Management
TDH-I	Terre Des Hommes Italia
TRWMP	Tsunami Recovery Waste Management Programme
TS-R2C3	Technical Support to Rehabilitation and Reconstruction Completion and Continuation Coordination
UD	<i>Usaha Dagang</i> (sole proprietorship)
UNDP	United Nations Development Programme
UN-HABITAT	United Nations Human Settlements Programme
UN-OCHA	United Nations Office for the Coordination of Humanitarian Affairs
YCAP	<i>Yayasan Cipta Aksi Partisipatif</i>

EXECUTIVE SUMMARY

Breadth of vision

The successful completion and delivery of an impressive range of results by the Tsunami Recovery Waste Management Project (TRWMP) should be recognised as a major achievement by the UNDP. It was conceived as a coordinated and pragmatic response to concerns associated with debris and municipal solid waste (MSW) management during the recovery and rehabilitation of Aceh and Nias Island following the 2004 tsunami. The short term aims of the Project were debris and rubble clearance and its corresponding improvement to public health protection, physical recovery and the creation of immediate temporary employment. These were later superseded by longer term goals to build management and technical capacity in local government and operate sustainable waste management systems. The TRWMP went further and undertook the promotion of waste management-related livelihoods and supported cost recovery initiatives in districts to sustain the upgraded waste services.

TRWMP activities commenced in March 2005 and were executed by a specialist project team based in Banda Aceh with field offices elsewhere to assist up to thirteen tsunami-affected districts. The Project had three phases during its seven-year lifetime.

- Phase I: Recovery - initial project activities focused on providing a coordinated, pragmatic response to the public sanitation and environmental concerns associated with tsunami/earthquake debris clearance and the management of municipal solid waste. NGO support was also mobilised to stimulate the creation of livelihoods from the recovery of materials from municipal waste (2005-2007).
- Phase II: Rehabilitation - transitional project activities focused on enhancing the local government capacity in coordinating the reconstruction process. Further support was also provided to promote sustainable livelihoods through waste management (2007-2009).
- Phase III: Reconstruction - project activities shifted from a focus on disaster recovery to improve and strengthen essential services for the longer-term development of waste management infrastructure and operations; capacity building of local government sanitation departments; creation of sustainable livelihoods in waste management; and safeguarding the environment (2009-2012).

The TRWMP initially collaborated with the national counterpart responsible for post-tsunami recovery, *Badan Rehabilitasi dan Rekonstruksi* (BRR - Rehabilitation and Reconstruction Agency). In April 2009 BRR completed its mandate and the partnering arrangements were revised. The National Development Planning Agency (Bappenas) was identified as a suitable partner, with additional technical and engineering support from the Ministry of Public Works. In addition No-Cost Extensions (NCEs) from the MDF were authorised to allow project activities to continue up to the end of December 2012. The additional time was used productively by the project team to complete waste landfill site construction at four locations – Blang Bintang, Pidie, Bireuen and Gunungsitoli.

Throughout its seven-year project life cycle, four constituent 'components' ran as common themes

during each phase of the Project. Each component was designed to provide communities, individuals and district administrations with financial and technical support to achieve demonstrable changes to the pre-tsunami situation:

- Component 1. Resumption of municipal solid waste (MSW) collection, disposal and clearance, including recycling tsunami-derived waste via the implementation of Tsunami Waste Recovery Facilities (land clearance, building removal, drainage clearance, MSW collection services, skills training in carpentry and furniture making)
- Component 2. Interim livelihood restoration and longer-term waste management livelihood creation via implementation of waste recycling projects and businesses
- Component 3. The rehabilitation of existing district dumpsites, including the provision of new interim and engineered landfills for enhanced, safer waste disposal
- Component 4. Effective and efficient management, monitoring and oversight of the Project and its activities on behalf of the MDF donor partners.

Design and monitoring

The TRWMP was understood to be the first major infrastructure project undertaken by UNDP in Indonesia. It deserves to be recognised as possibly the largest and most extensive solid waste infrastructure project that has ever been directly managed and implemented by a UN body. This was a considerable achievement and should be viewed as a credit to the organisation and its collaborators. Consequently, UNDP should ensure the results and benefits recorded from this project are widely disseminated and used elsewhere in Indonesia and potentially beyond the country within the international system.

The evaluation found the design and monitoring of the TRWMP to be extensive in its scope and well managed throughout most of the project cycle. A project of the breadth and complexity of the TRWMP will inevitably have legacy issues to be managed, institutional knowledge to record and retain and products that should be assigned to others to promote for the future. It was explained to the evaluation team that the interplay of three factors have influenced the project closure arrangements: (a) the deadline for the closing of the MDF; (b) the delay in the implementation of landfill construction; and (c) uncertainty over asset transfer regulations. The absence of a clear closure plan was noted and even at this late stage, a logical and planned conclusion of the remaining activities could be completed.

The decision to have a monitoring and reporting person within the project team has been acknowledged by MDF and the evaluation team as a beneficial decision. This indicated the regular reporting and supply of data to the donors was relevant and informative.

Relevance

The evaluation mission is satisfied the TRWMP was relevant to the needs identified by the post-tsunami rapid assessments, from which the UNDP's 'Emergency Response and Transitional Recovery Programme' was prepared. It is also consistent with the Government of Indonesia's 'Rehabilitation and Reconstruction Plan for Aceh and Nias [Island]'. The assessments indicated an overwhelming need for a substantial and sustained programme to address the safe removal of enormous quantities of debris and solid waste following the tsunami, land clearance to restoration of livelihoods and restore the functioning of municipal sanitation services. The prompt commencement of the TRWMP ensured it was able to respond extensively in both Aceh and Nias Island. The work undertaken in eight districts of Aceh and Nias Island in Phase 1 was considered to

be justified given to the large area along the west and east coasts and Nias Island affected directly by the tsunami. Whilst initially designed to address recovery from the physical effects of the tsunami, the flexibility in its project design made it a relevant platform in Phases 2 and 3 on to which longer term support could be given to improving municipal sanitation services in up to thirteen districts.

Appropriateness

It is the unequivocal view of the evaluation team that the TRWMP has been a positive influence on waste management in Aceh and Nias Island. It was the right project undertaken at the right time and was able to both deliver effective immediate assistance to communities and public bodies. Also, it has raised the longer term expectations for waste management in the future. From the tragedy of the 2004 tsunami, the aftermath presented a relatively unique project opportunity for waste management, an essential but often neglected public service, to undergo significant improvement. It is not possible to infer that every aspect of the Project has achieved consistently high satisfaction from the beneficiaries but those met from local administrations, village leaders and others associated with the Project have been consistent in their compliments. Those instances where there were problems reported, such as false starts with contractors used to clear agricultural land, the farmers were complimentary about the remedial measures put in place and with the final result achieved. Earlier independent and mid-term assessments made similar observations.

Effectiveness

The TRWMP managed an extensive programme of work and the cumulative achievements through Components 1, 2 and 3 were impressive. The evaluation concluded the US\$ 41 million investment in the Project was justified and had been put to effective use by UNDP. A headline summary of the significant outputs and outcomes delivered by the Project demonstrates the extensive scale of the benefit delivered:

Component 1 – Local government capacity building and land clearance

- Clearance of more than one million cubic metres of tsunami waste in urban areas, together with recovery of recyclable materials used to rehabilitate 100km of roads, provided 55 hectares of daily cover at landfills and manufactured 12,000 units of wooden furniture
- In 2005, TRWMP paid the wages for 400,000 days of temporary labour in a cash-for-work scheme involving debris clearance, street sweeping and a drainage clearance. Over the full period of cash for work (2005-2008) the average daily number of cash for work participants was 1451.
- Approximately 254 ha of tsunami-impacted agricultural land was cleared and is now back in productive use to the benefit of 946 households
- Demolition of 553 earthquake/tsunami damaged buildings including the Banda Aceh Water Tower and Kuala Tripa Hotel
- Training for government capacity building initiatives with a total of 1673 staff members participating and the development of a set of waste management training materials for municipal sanitation staff (in collaboration with UN-HABITAT)
- Awareness-raising on the opportunities for waste reduction and recycling involving potentially 36,629 school students.

Component 2 – Livelihoods rehabilitation and creation

- 164 SMEs created and/or supported of which 109 SMEs are still in business after 3 years of support

- Eight School Waste Garbage Banks help teach children about recycling and earn income for school activities
- 2,400 people were found to be employed through waste recycling SMEs, with an indirect benefit to 11,800 indirect beneficiaries
- US\$ 1.37 million worth of equipment distributed (e.g. baling presses, safety equipment, motorcycles)
- US\$ 1.34 million distributed as small grants used for start-up business capital and operational support
- 72,121 tonnes of waste recovered for recycling over the period of NGO support (2005 to 2010); ~67,000 tonnes of materials recycled sold successfully in the market.

Component 3 – Regional and district landfills

- 11 district interim landfills (26 ha of waste cells) were rehabilitated or reconstructed. These interim landfills provided safe and controlled waste disposal sites with storage capacity of three to five years, allowing time for permanent landfill construction
- Construction of the landmark Blang Bintang Regional Landfill for Kota Banda Aceh/Aceh Besar
- Construction of sustainable permanent landfills in Pidie and Bireuen districts
- Construction of a sustainable permanent landfill for Gunungsitoli is underway
- A mechanical workshop was constructed and waste management equipment provided for the Gampong Jawa Landfill
- 10 Environmental Impact Studies on landfills conducted
- Feasibility studies, site surveying and detailed engineering designs for sustainable permanent waste disposal facilities have been conducted for landfills in nine other districts (There is also the prospect of some or all of them being taken forward in a future national waste infrastructure project by the national Ministry of Public Works).

Efficiency

Overall, the evaluation team found the level of reporting and detailed documentation produced by the project team was substantial and relevant to the technical nature of the work undertaken. The motivation of project team was very high and sustained over the project lifetime except towards the end of 2012. Around this time important members left the team and the remaining staff had to take on additional burdens at a time when the completion of some activities was not proceeding smoothly.

A continuing issue has been the timeliness of the progress and completion of the procurement procedures. The centralisation of this function in Jakarta has at times created a mis-match between the needs of the Project to progress to deadlines and the inflexibility of the UNDP's global procurement policy and procedures, particularly for civil works. It was observed the traditional procurement procedures were orientated towards technical assistance activities and equipment purchase. They were not well designed for the timely approval, or delegation of authority to approve, for high cost civil engineering contracts. The Country Office showed leadership in taking forward discussions with its regional and headquarters counterparts involved in procurement. The standard General Terms and Conditions of Contract (GTCoC) used by UNDP were found to inadequately address civil engineering works and were not in line with current international practice as referred to by FIDIC - *Fédération Internationale des Ingénieurs-Conseils* (International Federation of Consulting Engineers). It was concluded the UNDP GTCoC needed to be supplemented, so some components of the FIDIC GTCoC were incorporated as supplementary conditions of contract. This took time to resolve but appears to have been a pragmatic way

forward.

One aspect of 'contracting' that worked well locally through the project office in Banda Aceh was the Letter of Agreement (LoA). This was used throughout the Project to agree with a district administration or other public body tasks and disbursements, which in effect permitted the project team to agree with local contractors to initiate work.

Impact

The most visible impacts from the TRWMP to the general public were in Phase 1 when huge volumes of debris was being removed, cash for work provided direct incomes for an average of 1451 people each day and tracts of land (~254 ha) in rural areas were cleared. Accumulatively, through land clearance hundreds of farmers and their families regained access to their land and the opportunity to re-build a livelihood. Farmer reported to the evaluation team their incomes had improved, helped by coordinated work with district agricultural departments to provide improved seeds and the general increase in the wholesale price of rice. They mentioned they have been able to accumulate some cash reserves to hire in equipment, improve the quality of life for their families and pay for better education of their children.

In Phase 2 the livelihood programme reached the peak of its activities across eleven districts. The provision of standard equipment such as baling equipment and *becaks* (motor scooters) reduced transport costs, increased the volumes of waste recycled and improved profitability. For a relatively small investment of US\$ 3 million support was provided, through specialist NGOs, to 233 groups and when reviewed after three years 73% (170 operations) were still active. Overall, it has been estimated during the period of assistance by the Project (2005-2009) an approximate total gross turnover of US\$18.5 million was achieved with a net profit of US\$2.5 million. Equally important, the NGOs estimate 72,121m³ of solid waste was diverted from landfill.

The interim landfills in Phase 1 provided to districts were a significant step forward from the pre-tsunami practice of universal open dumping. The improvements to land disposal were three-fold: safer disposal locations for tsunami wastes through the creation of better engineered facilities; practical training in waste management for waste department personnel; and better protection of the local environment. These interim sites were recognised as only a temporary solution. Correspondingly, the work in Phase 2 and 3 was designed to have longer term impact on the capabilities of districts. The capability of the waste management department of Kota Banda Aceh has been the most impressive example of professional and technical development achieved by the Project. Its upgraded existing site (now closed) at Gampong Jawa has been used as a reference site for other Indonesian waste managers and students. The new regional landfill Blang Bintang, for Banda Aceh and Aceh Besar, is regarded as a showpiece site design and providing the capable management team is moved from Gampong Jawa site to the new site site, then it is likely Blang Bintang will be a successful operation. Other districts such as Pidie and Bureuen have shown notable improvements and were selected to have modern engineered landfills constructed. The fourth new site in Gunungsitoli district has been seriously delayed. The evaluation team was also concerned with the future prognosis for this site due to the lack of adequate budget, senior staff changes in the district and perceived weaknesses in waste management knowledge in the sanitation department.

Sustainability

The land clearance achievements are undoubtedly sustainable with most of the cleared land now being actively farmed. Sustainability in waste recycling livelihoods has also been achieved, in all of

the principal technical, environmental and financial/economic aspects. The evaluation team found the transport vehicles and equipment provided by the Project was mostly appropriate, easy to operate and spare parts were available locally. It was also an encouraging to note most of the recycling operations given support by the Project were still in operation. Waste recycling has proved to be financially sustainable in most instances. Interviews with SME employers revealed there are still large quantities of further waste to be recycled and a dependable market in Medan for the processed materials.

The TRWMP has demonstrated it is possible to develop both intermediate and advanced landfill sites in Indonesia using largely local construction techniques, contractors and materials. Where there is determination within a local administration and access to sufficient funds then the landfill designs developed by the Project should be applicable to places elsewhere in Indonesia. The interim landfills were effective in beginning the transition away from open dumping. A common basic landfilling concept has been adopted using an excavated disposal cell and a common leachate management approach. This has introduced a consistency in design that has the flexibility to be tailored to a local physical location. This packaged approach is suitable for use elsewhere, although the tailoring to other locations will still require specialist consultant input.

The weakest link in ensuring the success of the better landfilling is sustaining a good standard of site operation. The UNDP should continue to monitor the performance in the early months of operation at the new engineered landfills at Blang Bintang, Pidie, Bireuen, and Gunungsitoli. The UN-HABITAT waste management manuals are a significant new training resource and should be disseminated widely in Indonesia and across the region.

Gender

Gender issues were not mainstreamed at the start of its activities. The original Project was designed to assist with the recovery after the tsunami and some activities were predominantly engineering based involving the use of specialist contractors to clear land, demolish buildings and construct interim landfills. These engineering-led activities appear to have a structural imbalance in the employment of women. During the technical and operational training on SWM organised through the TRWMP 9.5% of the participants from district waste management departments and public administrations were women. This was a promising observation but there is still some way further to go to open up opportunities in the public waste sector. In particular, traditional views appear to assume female employees in waste management are inclined to work in certain roles, generally support or clerical roles in offices, which are lower paid and lower in status.

The most prominent, large employment opportunities were in the cash for work and livelihoods for waste recovery activities. The Project database recorded under cash for work activities, 32% were female workers. It was not apparent why this percentage was consistently lower than for males, other than a possible cultural disinclination for women to be involved in waste-related manual labour. The most accurate information found on the involvement of women was compiled by the NGOs for the livelihoods from waste component. The second livelihoods assessment report found the industry was capable of employing a significant proportion of female workers and was evident in almost all SMEs visited by that mission. Certain NGO and *koperasi* projects employed 100% women. TDH-I reported 40% of their total beneficiaries had been women. The project team provided summary data that reports 2,400 (36% females) people were employed through the SMEs, with a further benefit to 11,800 indirect beneficiaries (54% females).

Notable lessons

Waste management is often a low priority topic in district administrations and the endeavours by the project team to engage with local political leaders were mixed. A disturbing dimension of public sector management in Indonesia is the regular rotation of middle and senior level managers and the situation where a new manager has no knowledge or inclination toward waste management. This situation has occurred on several occasions during the lifetime of the TRWMP.

The evaluation found that for most aspects of the work little attention was paid to encouraging active community participation in the decisions taken over waste services and new disposal facilities. Two exceptions were some community outreach made by the NGOs involved in the livelihoods from waste recycling component and the active discussion held with rural communities before and during land clearance activities.

It is understood there remain a delay in the prompt transfer of assets from the TRWMP, namely the various landfill facilities and the transfer station and vehicle workshop at Gampong Jawa. There is now an urgency for the Government of Indonesia to clarify the asset transfer arrangements.

The UNDP should see itself as a natural partner to the international financing institutions to provide specialist assistance on future waste infrastructure lending projects. In particular, assistance at the pre-feasibility and disbursement monitoring stages of a project life cycle. If a new project was to be considered for Indonesia then a prominent place for a replication project could be in Jakarta.

Recommendations

Recommendations are presented largely as measures to safeguard the national and international investment into waste management improvements in Aceh and Nias Island.

Development Assistance

Recommendation 1. UNDP should continue act as the catalyst and focal point with the Government of Indonesia on improving waste management and stand ready to implement on behalf of the international community.

Recommendation 2. UNDP should make provisions to see through to completion the construction and operation of the fourth sanitary landfill (Gunungsitoli).

Recommendation 3. There remains an active risk of regression in some districts whereby waste management practices could revert back to open dumping. The UNDP should agree with the Ministry of Public Works the measures to intervene in such locations.

Recommendation 4. UNDP should continue to work with national ministries to achieve national certification for the waste management training modules, actively promote their use and disseminate them widely.

Recommendation 5. UNDP should continue its engagement with national ministries to clarify the method by which districts can present their landfill designs for consideration for funding under the forthcoming Accelerated Infrastructure Project. The design packages should also be offered to other districts as a starting point for the upgrading of landfill disposal in their areas.

Recommendation 6. The livelihoods from waste recycling, including the promotion of school garbage banks and utilising NGO support, are obviously replicable to other parts of Indonesia. UNDP is encouraged to seek opportunities to build these activities into its forthcoming programmes.

Recommendation 7. At national level there appears to be momentum behind the work of ministries to improve the funding available for waste infrastructure improvements. UNDP should seek to actively engage in dialogue with national bodies over the emerging ideas for a possible 'donor infrastructure trust fund'; regionalisation of waste disposal with a separation of waste collection and disposal between district and provincial governments respectively; and the possible development of national technical standards for waste management.

Recommendation 8. UNDP should move promptly to resolve with the national government the apparent queries surrounding the transfer of assets at the end of the TRWMP.

Post-disaster initiatives

Recommendation 9. UNDP has built up a solid reputation and body of experience in the design and execution of debris removal and land clearance activities during a post-disaster recovery phase. This specialist knowledge should be maintained, and alongside the in-house waste management experience, should be managed in the future as part of UNDP's emergency response capabilities.

Recommendation 10. UNDP has also developed through the TRWMP an emergency response capability to re-establish waste collection operations by assisting public bodies in district administrations. This capability includes both the rapid implementation and management of large-scale cash for work programmes and the subsequent transition to a more sustainable waste fee-funded public service.

Recommendation 11. To complement its collection and clearance capabilities, UNDP now has unparalleled experience within the international community in Indonesia to design and construct interim landfills as part of a coordinated post-disaster recovery response. This capability should be made available to assist in future emergency response operations.

INTRODUCTION

Background

1. This independent assessment was undertaken at the conclusion of the long running TRWMP Project following a request from the UNDP Indonesia Country Office on behalf of the principal stakeholders: UNDP; Bappenas; Ministry of Public Works; the local governments of Aceh and Nias Island; MDF and key donors. The main purpose was to identify and chronicle the successful and less successful activities within the Project, evaluate its long-term results, comment on the sustainability of the Project's benefits, and note the lessons learned to inform future interventions in both general development and post-disaster recovery situations.

2. The evaluation report is a product of the qualitative and quantitative data gathered from project documents and previous mid-term reviews, combined with information obtained through discussions and meetings with stakeholders in Kota Banda Aceh, Gunungsitoli, Pidie, Bireuen, Aceh Jaya and Aceh Besar districts, project team members and at national level in Jakarta. The substantive part of information gathering took place during the first mission by the evaluation team in November/December 2012. Also, presented in the report are details on the practical benefits derived by communities and public bodies. Illustrative case studies are presented for two of the components within the TRWMP Project: land clearance and waste-related livelihoods.

Scope and Objectives

3. The scope and objectives addressed in this evaluation are based on the full Terms of Reference described in Annex 1, summarised as:

1. To review and critically evaluate the achievement of results since the last mid-term review as stated in the project documents
2. To review each stage of the project in relation to the whole project, and in relation to the separate stages (post disaster early recovery, reconstruction and long term development of sustainable environmentally focused solid waste management systems) and determine what has worked well and has not worked well
3. To review and contextualize UNDP's TRWMP project efforts as part of the larger ERTR tsunami response effort and overall UNDP Country Programme
4. To determine whether there have been any unexpected results in addition to the planned outputs specified in the project documents
5. To gain insights into the level of client satisfaction and expectation with the project. The clients include community and local government beneficiaries; national government partners and donors
6. To distil and document lessons learned from the TRWMP project; including those pertaining to approaches, strategies, gender mainstreaming, management and partnerships, both in the context of country specific lessons and those relevant to other international post disaster programmes
7. To assess the effectiveness of capacity development for district level sanitation departments and the extent to which it contributed to overall improvement of sanitation departments' performance
8. To provide recommendations in light of the findings of the assessment to enable UNDP to sustain the benefits of the project and effectively respond to any future disasters both in Indonesia and globally within the solid waste and environment sector.

DESCRIPTION of INTERVENTION and PROJECT SUMMARY

Intervention

4. The Tsunami Recovery Waste Management Project (TRWMP) was conceived to provide a coordinated, pragmatic response to the public health and environmental concerns associated with debris and municipal solid waste (MSW) management during the recovery and rehabilitation of Aceh and Nias Island following the 2004 tsunami. The short term aims of the Project were debris and rubble clearance and creation of immediate temporary employment. These were later superseded by longer term goals of building management and technical capacity in local government and development of sustainable waste management systems. Additional intentions were to promote waste management-related livelihoods and more realistic cost recovery and budgeting of public funds to finance an upgraded waste service in each district. This shift in focus was reflected in a revised Project Development Objective:

'To improve and sustain the environment of Aceh and Nias [Island] through: (a) strengthening the capacity of local government to conduct effective efficient collection, recovery and disposal of municipal and tsunami waste; (b) rehabilitation of critical waste management infrastructure; and (c) supporting local enterprises in the creation of livelihoods opportunities in recovery, processing and recycling of waste, and clearance and rehabilitation of tsunami impacted agricultural land.'

5. TRWMP activities commenced in March 2005 and were executed by a specialist project team within the United Nations Development Programme (UNDP) through the Aceh Emergency Response and Transitional Recovery (ERTR) Programme. The ERTR operated in partnership with the Rehabilitation and Reconstruction Agency (*Badan Rehabilitasi dan Rekonstruksi – BRR*). The implementation of the individual components and activities within the TRWMP was achieved subsequently through partnerships with local government waste management departments in thirteen districts across Aceh and Nias Island: Kota Banda Aceh, Aceh Barat, Nagan Raya, Pidie, Aceh Jaya, Aceh Besar, former Nias district [now Gunungsitoli], Nias Selatan, Lhokseumawe, Aceh Utara, Bireuen, Sabang and Simeulue.

6. Since December 2005, the project has been funded in three phases with a total provision of a US\$ 39.4 million grant from the Multi Donor Fund for Aceh and Nias [Island] (MDF). TRWMP also received a contribution from the French Red Cross for the amount of US\$ 550,000. Consequently, the total budget for the TRWMP was US\$ 39,996,208. The focus of each Project phase is summarised below:

- Phase I: Recovery - initial project activities focused on providing a coordinated, pragmatic response to the public sanitation and environmental concerns associated with tsunami/earthquake debris clearance and the management of municipal solid waste. NGO support was also mobilised to stimulate the creation of livelihoods from the recovery of materials from municipal waste (2005-2007)
- Phase II: Rehabilitation - transitional project activities focused on enhancing the local government capacity in coordinating the reconstruction process. Further support was also provided to promote sustainable livelihoods through waste management. These activities

were in accordance with the Master Plan for Rehabilitation and Reconstruction of Aceh and Nias (2007-2009)

- Phase III: Reconstruction - the project activities shifted from a focus on disaster recovery to improve and strengthen essential services for the longer-term development of waste management infrastructure and operations; capacity building of local government sanitation units; creation of sustainable livelihoods in waste management; and safeguarding the environment (2009-2012).

7. Following the closure of BRR in April 2009 and ERTR in the third quarter of 2010, TRWMP revised its partnering arrangements. The National Development Planning Agency (Bappenas) was identified as a suitable partner. This arrangement was consistent with TRWMP's Phase 3 focus on institutional and capacity building for sustainable waste management. In the third quarter of 2010, TRWMP revised the formal Project Document, which reflected Phase 3 objectives and its new partnership with Bappenas, was approved with the Government of Indonesia (May 2011).

8. In addition to the new partnering agreements, TRWMP also received No-Cost Extensions (NCEs) from the MDF to allow project activities to continue to the end of December 2012. The additional time was used by the project team to complete its waste landfill components using counterpart district and provincial funds to match the MDF funds. The additional time also allowed for extended capacity building activities, prior to the departure of TRWMP assistance, to maximise efforts to embed the principles of sustainable solid waste management operations within some district sanitation departments.

9. The TRWMP had four constituent 'Components' designed to provide communities, individuals, administrations and local waste management departments with financial and technical support to achieve the following:

1. Resumption of municipal solid waste (MSW) collection, disposal and clearance, including recycling tsunami-derived waste via the implementation of Tsunami Waste Recovery Facilities
2. Interim livelihood restoration and longer-term waste management livelihood creation via implementation of waste recycling projects
3. The rehabilitation of existing dumpsites, including the provision of sanitary landfills for enhanced, safer waste disposal
4. Effective and efficient management, monitoring and oversight of the Project and its activities on behalf of the MDF donor partners.

10. The Project's cumulative outputs for Components 1, 2 and 3, as reported by the project team, are summarised below:

Component 1 – Local government capacity building and land clearance

- Clearance of more than one million cubic metres of tsunami waste in urban areas, together with recovery of recyclable materials used to rehabilitate 100km of roads, provided 55 hectares of daily cover at landfills and manufactured 12,000 units of wooden furniture
- In 2005, TRWMP paid the wages for 400,000 days of temporary labour in a cash-for-work scheme involving debris clearance, street sweeping and a drainage clearance. Over the full period of cash for work (2005-2008) the average daily number of cash for work participants was 1451, of which 32% were women and 68% were men.

- Approximately 254 ha of tsunami-impacted agricultural land was cleared and is now back in productive use to the benefit of 946 households
- Demolition of 553 earthquake/tsunami damaged buildings including the Banda Aceh Water Tower and Kuala Tripa Hotel
- Training for government capacity building initiatives with a total of 1673 staff members participating (9.5% female) and the development of a set of waste management training materials for municipal sanitation staff (in collaboration with UN-HABITAT)
- Awareness raising on the opportunities for waste reduction and recycling involving potentially 36,629 school students.

Component 2 – Livelihoods rehabilitation and creation

- 164 SMEs created and/or supported of which 109 SMEs are still in business after 3 years of support
- Eight School Waste Garbage Banks help teach children about recycling and earn income for school activities
- 2,400 (36% females) people employed through SMEs, with an indirect benefit to 11,800 indirect beneficiaries (54% females)
- US\$ 1.37 million worth of equipment distributed (e.g. baling presses, safety equipment, motorcycles)
- US\$ 1.34 million distributed as small grants used for start-up business capital and operational support
- 72,121 tonnes of waste recovered for recycling over the period of NGO support (2005 to 2010); ~67,000 tonnes of materials recycled sold successfully in the market.

Component 3 – Regional and district landfills

- 11 district interim landfills (26 ha of waste cells) were rehabilitated or reconstructed. These interim landfills provided safe and controlled waste disposal sites with storage capacity of three to five years, allowing time for permanent landfill construction
- Construction of the landmark Blang Bintang Regional Landfill for Kota Banda Aceh/Aceh Besar
- Construction of sustainable permanent landfills in Pidie and Bireuen districts
- Construction of a sustainable permanent landfill for Gunungsitoli is underway
- A mechanical workshop was constructed and waste management equipment provided for the Gampong Jawa Landfill
- 10 Environmental Impact Studies on landfills conducted
- Feasibility studies, site surveying and detailed engineering designs for sustainable permanent waste disposal facilities have been conducted for landfills in nine other districts (These are expected to be taken forward in a future national waste infrastructure project by the national Ministry of Public Works).

METHODOLOGY

11. The evaluation team conducted a qualitative and quantitative assessment of the Project's outcomes in each of its three phases and its performance in delivering well-conceived activities, in a timely and sustainable manner. Data and information was collected through a desk review of previous reports and project documents; interviews with project management personnel,

collaborating partners and other beneficiaries; and field visits to land clearance, waste management and materials recovery sites (list of meetings and visits presented in Annex 2). The evaluation included visits and interviews in Aceh and Nias Island, with further details obtained at the national level in Jakarta. The evaluation was conducted in five stages over a 30-day working period between 28 November 2012 and 28 February 2013:

- Preparation – Familiarisation of reports and supporting information provided by UNDP in advance of travel to Indonesia (listed in Annex 3), critical review and completion of visits and meeting schedules
- Inception and field review - Review of achievements in recovery, land clearance, sustainable waste management, livelihoods and capacity-building over the three phases of the TRWMP, site visits, discussions with UNDP, municipal and other key partners, participation in a suggested stakeholders workshop to receive feedback on the Project, and completion and delivery to UNDP of an Inception Report
- Critical review – Undertake an in-depth review and critique of achievements from the TRWMP, compare against the standard evaluation criteria the mission findings, documented outcomes and international comparisons, follow up unresolved issues with UNDP and prepare the draft evaluation report
- Presentation – Undertake a further round of confirmation meetings with relevant stakeholders, then present the draft assessment evaluation report to the UNDP. Lead a workshop presentation to disseminate the findings to TRWMP personnel and others and receive feedback on the draft
- Finalisation – Conclude the assessment and evaluation report. Feedback would be incorporated before the completed final report is issued.

12. In accordance with UNDP evaluation guidelines, the evaluation included an assessment of the implementation of the TRWMP in terms of its effectiveness, efficiency, appropriateness, relevance, impact and sustainability.

During the preparation and critical review phases various written materials were examined including:

- The original Project Document and subsequent revisions and proposed work plans
- Quarterly Monitoring Reports
- Individual project planning, engineering design and bidding documents
- Mid-term assessment reports
- Summaries of livelihood assessments
- Information on the activities from the project implementation team
- LOA agreements, TIM SWM reports, manuals, land clearance reports
- Any other relevant material.

13. For the purpose of collecting qualitative data, an initial set of questions was prepared. These questions served as guide for free-form discussions during interviews and field visits. Meeting and site visit reports were prepared and presented in Annex 4. The evaluation questions prepared during the inception stage are reproduced in Annex 5.

Limitations to the evaluation

14. The availability of accurate data prior to the tsunami was limited. Data gathering in the past

had been relatively constrained due to access difficulties in some parts of Aceh and the relatively rural locations affected by the disaster. Consequently, the numbers of families benefiting from the clearance of agricultural land and the level of materials recovery undertaken after the TRWMP intervention, compared to before the tsunami, was difficult to ascertain with accuracy.

ASSESSMENT and EVALUATION FINDINGS

Project evolution

15. The focus and deliverable outputs from the TRWMP have evolved over the seven-year period of the project lifetime (2005-2012). Operations commenced in March 2005, three months after the tsunami event, and was executed by a specialist project team based in Banda Aceh led by a professional engineer and represented a constituent part of the Aceh Emergency Response and Transitional Recovery (ERTR) Programme. The Project also represented the drawing together and replacement of ad hoc, disparate activities into a better defined and coherent programme of work to assist the most affected districts. Activities were initially designed for two years (2005-2007) and focussed upon the recovery of land, debris clearance and re-introduction of public health measures relating to MSW in the immediate aftermath of the tsunami. The Project was structured to have four integral components running concurrently: 1. Local government capacity building and land clearance; 2. Livelihood rehabilitation and creation; 3. Regional and district landfills; and 4. Effective management, monitoring and oversight. Implementation of each component (particularly the 'field' Components 1, 2 and 3) and their individual activities was achieved through a wide range of partnerships with local waste management departments, communities, NGOs and national bodies. This was in line with the agreed requirements of the donors, through the MDF, and summarised in the stated intentions at the outset of the Project. Eight districts were assisted directly in Phase 1.

TRWMP Phase 1: Initial project activities focused on providing a coordinated, pragmatic response to the public sanitation and environmental concerns associated with tsunami/earthquake debris, municipal solid waste management, and creation of livelihoods in waste management (2005-2007)

16. During the first phase it became evident to the UNDP, donors and the national government a longer period of assistance to Aceh and Nias Island was required to achieve a sustainable reconstruction of the regional economy, social cohesion and improved public services. A second phase was supported by the MDF between 2007 and 2009. This phase concentrated upon enhancing local solid waste facilities and management capacity within districts and the creation of new livelihoods from waste recycling, as well as the expansion of opportunities from existing materials recovery operations. Phase 2 represented the peak of the Project's operations with assistance extended over a wide geographical area to thirteen districts across Aceh and Nias Island: Kota Banda Aceh, Aceh Barat, Nagan Raya, Pidie, Aceh Jaya, Aceh Besar, former Nias district (now Gunungsitoli), Nias Selatan, Lhokseumawe, Aceh Utara, Bireuen, Sabang and Simeulue.

TRWMP Phase 2: Transitional project activities focused on enhancing the local government capacity in coordinating the reconstruction process and promoting sustainable livelihoods through waste management mechanisms, in line with the Master Plan for Rehabilitation and Reconstruction of Aceh and Nias [Island] (2007 -2009)

17. In accordance with the donor's requirements the final phase (2009-2012) focused on creating

the best platform possible for sustainable improvement in the handling and disposal of solid waste. Its objectives were ambitious. It sought to provide each district with either a blueprint packaged design or a physically constructed modern landfill site; detailed training and guidance on how to fund and operate improved facilities in the future; and, in effect, endeavouring to increase the expectations within communities on the quality of waste service they receive. The number of districts supported decreased to twelve with the ending of assistance to Nias Selatan.

TRWMP Phase 3: The project's activities shifted from a focus on disaster recovery to restarting essential services for longer-term development of waste management infrastructure and services, capacity building of local government sanitation units, creation of sustainable livelihoods in waste management, and safeguarding the environment (2009-2012).

Project structure

18. The original TRWMP Development Objective (for Phase 1) was:

'To advise the government on sustainable waste management practice and implement technical assistance programmes to build capacity. Develop tsunami and longer-term municipal waste management strategies for affected communities and enable the rapid implementation of waste management pilot projects.'

19. This original Development Objective had four 'Project Outputs' (subsequently termed 'Components') orientated towards rapid assistance measures in the Kota Banda Aceh and Aceh Besar districts. The TRWMP was also mandated to work in other affected districts and activities were implemented relatively promptly in the Meulaboh and Calang areas and on the island of Nias. The initial focus was to initiate cash for work schemes to clear debris, accumulated solid waste and drainage channels; to avoid depositing waste in open dump sites; and use tsunami waste materials such as recovered wood to generate incomes. The highest profile scheme, regularly visited by international visitors overseeing post-tsunami recovery, was the construction of furniture from recovered waste wood at Gampong Jawa and its allied training in carpentry. The evaluation mission found the Development Objective to be realistic and proportionate for the immediate recovery activities after the disaster.

20. The early success of the Project was mobilising income generation, land and building clearance and establishing engineered interim solid waste disposal sites. Donors, with the agreement of the national government, sought to continue the Project after 2007. This required a new mandate. Accordingly, the Development Objective was revised for the subsequent phases to reflect a longer term aim to achieve better waste management capacity in local government. This public service would undergo the development of sustainable waste collection and disposal systems that benefit communities and the environment and facilitate improved cost recovery and the promotion of waste-related livelihoods. A revised Development Objective was agreed with donors and the Government of Indonesia in 2007 to reflect this transition to longer term assistance.

'To improve and sustain the environment of Aceh and Nias [Island] through; (a) strengthening the capacity of local government to conduct effective efficient collection, recovery and disposal of municipal and tsunami waste; (b) rehabilitation of critical waste management infrastructure; and (c) supporting local enterprises in the creation of livelihoods opportunities in recovery, processing and recycling of waste, and clearance and rehabilitation of tsunami impacted agricultural land.'

21. The description of the Project Outputs was also revised to reflect the requirements of the new Development Objective. It is noted in the early project documents that reference to 'Nias' represented Nias Island. When the intervention began there were two distinct districts: Nias and Nias Selatan. Subsequently, the island was reorganized into five districts, so the later documents principally refer to the Gunungsitoli, the district where assistance during Phase 3 has been most directly focused.

Project monitoring and reporting

22. A relatively straightforward project management structure was established directly between the BRR and the TRWMP project team (Annex 6), although it was noted that potentially three levels of oversight within the BRR had been set up (Head of BRR, National Project Director and Head of the Infrastructure Reconstruction Financing Facility (IRFF) Division). This may have led to some blurring of decision-making responsibilities, issues over the use of funds and delays in execution during the first Phase when rapid commencement of activities was most pressing. It is noted the TRWMP had no direct project reporting line with a national ministry (e.g. Ministry of Public Works) who would ordinarily be concerned with the longer term sustainability of infrastructure improvements at the national level. Maintaining a productive relationship with BRR was essential to the Project's success up to 2009. Thereafter, the BRR closed down and was replaced by Bappenas as the national counterpart in collaboration with the Ministry of Public Work. This appears to have been a logical and beneficial development in the oversight of the Project and the mobilisation of inputs to districts from the national level.

23. A further line of management oversight was required through the ETR Team Leader to the UNDP Country Office and then ultimately to the MDF Country Office. The focal point within the Country Office above the ETR Team Leader appears, at first sight, unclear in the 2007 arrangements. In programme management terms it is unclear in the diagram who within UNDP was the 'senior responsible owner' for the TRWMP at country level, i.e. the person at a senior level knowledgeable and responsible to the organisation and donors for ensuring the successful delivery of the Project.

24. The Project maintained a steady output of quarterly and annual reporting to the UNDP Country Office and the MDF. This frequency of reporting was consistent with the MDF financing agreement. The reporting requirements required by the French Red Cross were less demanding.

Project staffing and field locations

25. There is a logical and consistent approach to the structure of the project. A central team located in Banda Aceh was well-resourced with a critical mass and headed up by an experienced professional civil engineer. Its core functions were:

- Design of activities and organising the modes of delivery
- Implementation management
- Negotiations with main contractors
- Liaison with regional and district authorities and agencies
- In-the-field donor coordination
- Administration of procurement, personnel and reporting procedures.

26. The Project was adequately staffed such that the execution of each of the ‘field’ Components (Components 1, 2 and 3) was led by a team leader. The team organogram (Annex 7) indicates each team leader was supported by project assistants. The project team was found to be well motivated, knowledgeable and committed. Project administration appeared to be adequately addressed. It was inevitable, given the extensive geographical area covered by the TRWMP, the Project would require field offices to guide and oversee the implementation of physical works and the activities of local contractors. The number of field offices (Table 1) was adjusted during the project lifetime and determined upon factors such as geographical coverage of the field work in progress and the prevailing practical difficulties travelling around the districts included in the Project.

Table 1. Numbers of Field Offices and Project Staff in Each Year

Phase	Years	Project Staff	Field Offices (in addition to Banda Aceh Project Office)
1	2005	5	1
	2006	13	3
	2007	13	3
2	2008	13	5
	2009	19	5
3	2010	19	5
	2011	26	4
	2012	18	4
	2013	3	1

Source: TRWMP project team records

27. Observations were made by both mid-term assessments that attention had to be paid to ensuring the out-posted staff had adequate management skills and waste-related knowledge to maintain an effective oversight of the progress of implementation activities. They also had to be of sufficient calibre and capability to gain the confidence of key members of the local district and communities. When further offices were open in Phase 2 this probably stretched the project office in Banda Aceh to maintain oversight and quality control. Overall, the evaluation believes the majority of staff were well chosen although there were weaknesses in the experience and gravitas for a few of the personnel assigned to field locations. Nevertheless, the project team appears to have been proactive in making rearrangements when issues arose.

28. The Country Office was found to have given sufficient autonomy to the project team in Banda Aceh to manage the delivery of activities and maintain productive relations with regional and district administrations. Communications between the two centres was as good as could be expected during the recovery period though later in the Project's lifetime some mentioned the degree of attention from the Country Office on the Project lessened as other development matters across Indonesia took priority. The assigning of three project personnel by TRWMP to the Country Office was a practical response to facilitate better national coordination. There appears to have been protracted difficulties in administration between the two offices, particularly staff recruitment, release of funds and contracts approval. The Country Office was aware of these matters and for procurement in the latter years of the Project was able to build up familiarity with the requirements from the field and speed up approvals through the UNDP system.

Relevance

Relevance: the extent to which intended outputs and outcomes of the project are consistent with national and local policies and priorities and the needs of intended beneficiaries

Relevance to RPJMN 2004-2009

29. One of the development agendas mentioned in Indonesia's Mid-Term Development Plan (*Rencana Pembangunan Jangka Menengah Nasional* or RPJMN) 2004-2009 is 'Increasing the Welfare of the People'. This agenda included three topics, which are mostly relevant to the TRWMP, namely: (i) empowerment of cooperatives and SMEs; (ii) accelerating infrastructure development; and (iii) improving management of natural resources and conservation of functions of the natural environment.

a. Empowerment of cooperatives and SMEs: development of small and medium enterprises are directed at making a significant contribution to economic growth, the creation of employment opportunities, and to increasing competitiveness; while developing micro-enterprises will be directed at making a significant contribution to the increased income level of the low income bracket of society.

b. Infrastructure development: in the housing and settlement, the general targets in the development and management of waste is the increased total volume of wastes that can be transported to 75% by the end of 2009 and the improved performance of those involved in the managing of final disposal sites (TPA), in a manner that is environmentally friendly, in all metropolitan, large and medium size cities. In order to attain the targets, three programmes were to be conducted, namely the: (1) programme for community empowerment; (2) programme for developing institutions; and (3) programme for enhancing the performance of those managing waste and drainage matters.

c. Management of natural resources and conservation of functions of the natural environment: through the development of targets for the natural environment including: (i) the increased efforts for managing urban wastes by placing environmental protection as one of the policy determining factors; and (ii) an enhanced system for the management of hazardous and toxic substances for activities that have the potential for polluting the environment.

Relevance to RPJMN 2010-2014

30. The Project was also supporting the latest national development targets in the following fields:

a. Empowerment of cooperatives and SMEs: (i) improvement of the business environment for cooperatives and SMEs; (ii) development of products and marketing for cooperatives and SMEs; (iii) increase of human resources competitiveness for cooperatives and SMEs; and (iv) strengthening cooperative institutions.

b. Natural resources and environment: the targets are: (i) to support national economic development in particular to increase economic growth, improve competitiveness, and enhance community's welfare; and (ii) improve natural resources management and environmental conservation to realise sustainable development.

c. Infrastructure for housing and sanitation: the target is to improve community accessibility to adequate clean water services and sanitation.

d. Development of "left" behind areas: these are the more remote and disadvantaged areas of Indonesia that are targeted specially in national plans. A wide range of programmes result from this including accelerated efforts for increasing production and incomes (and thus employment) as well as better rural infrastructure and access to services for these areas. Aceh Besar, Pidie and Bireuen are all classified as left behind areas as are the districts of Nias Island. TRWMP has directly contributed to these national themes and targets.

Relevance with Rehabilitation and Reconstruction Plan for Aceh and Nias [Island]

31. Presidential Regulation No 30/2005 stipulates the targets in the Rehabilitation and Reconstruction Plan for Aceh and Nias [Island] are, amongst others, (i) recovery of human resources; (ii) realisation of development of housing, infrastructure for environment, clean water and sanitation; and (iii) recovery of the economy. The disaster recovery aspects of the RPJMN were clearly linked to the UNDP's Country Programme Action Plan for 2006 - 2010 (and to the disaster recovery, peace supporting and poverty reduction elements of the current UN Partnership for Development Framework for Indonesia). Given that TRWMP emerged from disaster recovery needs in both Aceh and Nias Island and from cooperation with BRR in Phase 1, it was clearly able to respond to recovery needs in both areas and was thus relevant to those needs, including those expressed in the BRR Master Plan.

Relevance to assisting tsunami affected areas

32. Immediately following the tsunami several agencies undertook assessment missions in Aceh and Nias Island between January and March 2005. Notably for the UN system, OCHA led in defining needs related to environment, infrastructure and municipal (public) services. Consultants from Stantec and Oxfam also contributed at this time credible and sound advice on waste and debris related assessments. All of the assessments were consistent in their findings. They pointed to an overwhelming need for a substantial and sustained programme to address the enormous quantities of debris and solid waste following the tsunami and the absence of functioning municipal sanitation services. Seven million tonnes of tsunami-related debris was estimated to be in Banda Aceh alone. The TRWMP was developed to operate in proactive partnership with inhabitants, local government and the designated national body, BRR. The Project became a constituent part of the UNDP's overarching ETRR Programme for Aceh and Nias [Island] to provide coordinated emergency response and assistance during the transitional stages of recovery.

33. The role of the TRWMP evolved in line with the evolution of the objectives of the ETRR towards reconstruction and rehabilitation for the longer term. Consequently, a strong correlation was found

between the TRWMP's activities and its modes of engagement with the needs assessed at the start of the emergency, as well as those modified by the donors and national authorities in subsequent years. Progress was found to be substantial in all components of the TRWMP, in comparison to the situation in the immediate aftermath of the tsunami. The extensive nature of the work initially across eight districts of Aceh was considered to be justified given to the large area along the west and east coasts and Nias Island affected directly by the tsunami. It was also noted that there were other tsunami-districts affected that fell outside the Phase 1 TRWMP programme of work. This was addressed in the later phases.

Wider institutional benefits from the Project

34. The status of waste management in all districts prior to the tsunami, even for the natural focal point of Kota Banda Aceh, was a poor and under-resourced public waste service. The long term presence of the TRWMP has acted as a driving force for change within both the waste management departments and with district administrations. The longevity of the Project has also helped to increase confidence amongst waste managers to do better. Kota Banda Aceh with Aceh Besar led in this respect. The evidence from the field visits during the mid-term assessments and the final evaluation found the levels of improvement in SWM and benefits to communities achieved by a district was broadly correlated with the commitment and interest shown by the Head of the local waste management department and one or more members of the legislature. The first drove change within the workforce whilst the second lobbied for adequate local legislation (e.g. qanuns for fee recovery and standards setting) and funding to sustained improved operations.

35. An indication of wider benefits to the Indonesia were noted when TRWMP staff have been requested to join in to assist with organising of debris and waste clearance during the recovery period following more recent emergencies, e.g. in Padang after the Western Sumatra earthquake in 2009. There is a risk the body of experience built up will dissipate following the end of the Project and the UNDP Country Office is encouraged to take steps to retain its institutional memory through the preparation of guidance material for future personnel and consider the possibly of maintaining a rota of experienced personnel in the country.

36. The involvement of UN-HABITAT in the development of eighteen waste management training modules has also been a significant achievement with wider implications. The modules should be finalised into a publishable version without delay and are relevant to future activities to improve solid waste management in other parts of Asia and potentially beyond.

37. It is disappointing to note the endeavours by the UNDP and UN-HABITAT over the past two years to have the waste management modules certified by the national authorities in Indonesia has not been completed. No further work has been taken forward on pursuing certification since March 2012 when a member of UN-HABITAT staff departed. It was commented by UNDP personnel and some waste managers that it would represent a significant boost to achieving professionalism in waste management if this training was recognised officially as an accredited qualification and able to be entered on to the personnel record of public officials. UNDP is encouraged to continue its efforts with the national government to achieve the necessary certification and, in any event, to make the modules available via the internet and on CD.

Relevance to improving the prominence of district waste services

38. The Project has generated considerable interest in improvements to SWM across the country, both at the upgraded Gampong Jawa landfill (recently completed and now used as a waste transfer

station) in Banda Aceh and operations run by DKP, as well as the new regional sanitary landfill at Blang Binang. The new regional site is regarded as possibly the most modern landfill facility in Indonesia and has been mentioned by the Ministry of Public Works as a model site. During its construction it has attracted a number of delegations from other parts of the country and this is expected to continue in the future.

39. In Phase 3 the development for each of the eleven districts of a 'full package design' for a new sanitary landfill also raised the profile of waste management more generally within some administrations. The Ministry of Public Works and TRWMP agreed a set of 'eligibility criteria' from which four new landfills were constructed (including Blang Bintang). Nevertheless, it is encouraging to note the districts not selected have the opportunity to submit their design package for inclusion in a major national investment programme coordinated by the Ministry of Public Works: the 'Accelerated Infrastructure Project 2013-2017'. It is also noted the package landfill design is probably transferrable to other regions and districts of Indonesia and could also be considered by international agencies for use elsewhere in countries with similar climatic conditions.

Relevance to improving community engagement with better waste services

40. Community engagement in understanding and seeking improved standards in waste collection and disposal was not an integral part of the TRWMP design. Whilst communities have benefitted from early activities in Phase 1 when substantial quantities of debris clearance and street sweeping were supported through cash for work programmes, in the second and third phases little evidence, except for livelihoods from wastes, was found of direct activities being undertaken by the Project to ascertain community attitudes through surveys or to further public education in safer waste practices. This is regarded as a missed opportunity to improve the prominence of waste service to householders and district administrations and so driving demand for better services from residents. One notable community engagement success has been the Project's support for school garbage banks in eight locations. At these schools the assistance and guidance to raise money for schools has definitely raised the profile of waste recovery with school pupils and families in the catchment areas. However, with just eight schools involved in garbage banks this means only a small number of communities have been impacted. Additional efforts to engage more schools would be necessary to make a substantive impact on raising the profile throughout all districts.

41. One district, Kota Banda Aceh, has made a very public declaration of improving its environment through coordinated improvements in waste management as part of its wider ambitions for the population to improve the environmental sustainability of the city. Banda Aceh has also stated its intentions to become a national leader in municipal environmental improvement. It has already won the national Adipura environment award on four occasions. One occasion was before the tsunami and three occasions were afterwards.

Emerging governance issues

42. The TRWMP was initially designed to address the recovery from the physical effects of the tsunami. However, the flexibility in its design made it a relevant platform on to which longer term support could be given to improving the governance and accountability of this (and potentially other) municipal public services. The large component of engineering and land procurement in the Project and the requirement to follow formal and transparent purchasing procedures was a significant contribution to improving governance in general. This improvement was at two levels. First, the TRWMP gave exposure to both managers and administrators within district waste management departments on the approaches followed by international organisations to be accountable for making procurement and investment decisions. Some of the procedures would

have been seen as laborious but they served to indicate what should be expected in similar situations in the future. The length of time this first-hand experience will be retained within districts without positive reinforcement is unclear.

43. Secondly, the Project introduced the disciplines of record-keeping, budgeting and training, as well as the importance of adequate local legislation and political will to maintain higher standards of waste services into the future.

44. The Project was assessed to be a relevant contribution to advancing the theme of good governance. Structural issues were noted within the public services, such as regular staff rotation, lack of observed delegation of (and acceptance of) individual decision-making responsibilities and unexpected placement of non-specialists into specialist higher management positions. These will continue to need to be addressed after the completion of the TRWMP.

Appropriateness

Appropriateness: the cultural acceptance as well as feasibility of the activities and methods of delivery

Satisfaction amongst beneficiaries

45. It is the unequivocal view of the evaluation at the end of its seven-year programme of work the TRWMP has been a positive influence on waste management in Aceh and Nias Island. It was the right project undertaken at the right time and was able to both deliver effective immediate assistance to communities and public bodies and raise longer term expectations for waste management in the future. It has been a relatively unique project opportunity for an essential but often neglected public service. It is not possible to infer that every aspect of the Project has achieved consistently high satisfaction from the beneficiaries but those met from local administrations, village leaders and others associated with the Project have all been consistent in their compliments and satisfaction. Those instances where there were problems reported, such as false starts with contractors used to clear agricultural land, the farmers were complimentary about the remedial measures put in place and with the final result achieved. Earlier independent assessments have also stated their satisfaction with the achievements delivered.

Appropriateness to the community

46. All of the activities encompassed by the TRWMP were ultimately intended to benefit local communities. Activities such as the extensive cash for work programmes to restart waste collection and clear debris, buildings and land clearances and promotion of livelihoods from waste recycling were all directly appropriate to local communities and appear to have been readily accepted. The land clearance communities visited all expressed appreciation for the work undertaken by the Project. It was not possible in the time available to meet cash for work beneficiaries. Representatives from the local district governments in Aceh (in particular Banda Aceh and Pidie) said the improved MSW waste collection, originally supported by TRWMP, and the new landfill facilities and technical training will benefit the public and their local environment. On Nias Island the local district representatives in Gunungsitoli were less equivocal about the benefits for the solid waste activities and the community. This view may be influenced by the prevailing institutional concerns within the district administration over their capacity to manage their new

landfill site and a simmering dispute with villagers living close to site over the access road and traffic hazards from waste trucks.

Appropriateness to gender

47. The original Project was designed to assist with the recovery after the tsunami and some activities were predominantly engineering based involving the use of specialist contractors to clear land, demolish buildings and construct interim landfills. These engineering-led activities appear to have a structural imbalance in the employment of women. During the technical and operational training on SWM organised through the TRWMP 9.5% of the participants from district waste management departments and public administrations were women. This was a promising observation but there is still some way further to go to open up opportunities in the public waste sector. Throughout the established waste management and engineering fields it was noted by previous assessments that mainstreaming of opportunities for women was challenged by tradition and attitudes. In particular, traditional views that female employees in waste management are inclined to work in certain roles, generally waste segregation or clerical roles in offices, which are lower paid and lower in status.

48. The most prominent activities involving large employment opportunities were in the cash for work and livelihoods for waste recovery activities. The employment of women was not explicitly mainstreamed in the initial project design, although it was identified in an internal strategy paper in 2007 as an important element to integrate into the subsequent programming cycle of the TRWMP. The Project database recorded a daily average of 1451 participants funded under cash for work activities, of which 32% were reported as female workers. It was not apparent why this percentage was markedly lower than for males, other than a possible cultural disinclination for women to be involved in waste-related manual labour. The data suggest a missed opportunity for women to have been more actively involved in the cash for work programme.

49. The most accurate information found on the involvement of women was compiled by the NGOs for the livelihoods from waste component. The second livelihoods assessment report found the industry was capable of employing a significant proportion of female workers and was evident in almost all SMEs visited by that mission. Certain NGO or *koperasi* projects employed 100% women. The TDH-I NGO reported 40% of their total beneficiaries had been women. The project team provided summary data that reports 2,400 (36% females) people were employed through the SMEs, with a further benefit to 11,800 indirect beneficiaries (54% females). It was not possible to establish the composition or source of these statistics as the responsible team members were not available.

50. The collection of gender-disaggregated monitoring data was a positive aspect of the programme and TDH-I prepared a specific Gender Strategy. However use of gender-disaggregated data from the assessment phase could have been improved. There was little evidence that female-led SMEs were specifically targeted. A Final Evaluation report prepared in 2009 by Austcare recommended that future livelihoods from waste activities could mainstream women in the full range of roles in this sector:

- Women as entrepreneurs for new start ups
- Women as organisers of waste management community projects
- Women waste-pickers organised into collectives
- Women in higher supervisory and management activities over waste-pickers.

Appropriateness to local and provincial government

51. The TRWMP development objective was specifically designed to undertake activities that benefit local government. The most obvious direct assistance provided was the solid waste management component of the Project. It is without doubt these activities within the TRWMP were an appropriate opportunity to support the improvement of a district-level public service. Consequently, setting up activities to improve waste collection and land disposal required considerable interaction with elected representatives, senior officials and technical staff in waste management departments. The strongest relationships with elected representatives of district governments observed by the evaluation mission were with Banda Aceh and Pidie. Legislators in some other districts seem to have had less interaction with the Project and this may have weakened the ability to implement and sustain waste-related improvements.

52. Waste management was generally a neglected area of responsibility where the use of open dumping and limited coverage of waste collection services were the norm. The waste disposal needs following the tsunami forced districts to address their disposal methods and the availability to them of financial and technical resources from the TRWMP was an appropriate approach to bring about change. It was commented by the project team and others that several district administrations have been slow to revise their budgeting process to ensure sufficient funds are available to maintain improved waste management or to present effective applications for budget support from central government.

Appropriateness to national government

53. Bappenas and the national Ministry of Public Works have closely supported the work of the TRWMP. In particular, they have become the driving force within Indonesia to take forward the improvements achieved by TRWMP in new land disposal sites as an integral part of new infrastructure investments in districts in Aceh, Nias Island and elsewhere across the country. The packaged landfill designs are available to be used as a template approach to assess projects elsewhere. The TRWMP supported landfill improvements at Gampong Jawa and subsequently, Blang Bintang are used by national bodies as reference sites and for the training of waste managers. One legacy of the TRWMP has been a practical contribution to the development of public waste sector investment policy now being taken forward by national bodies. Practical manifestations have been the forthcoming Accelerated Infrastructure Project 2013-2017 led by the Ministry of Public Works and the idea of an Infrastructure Trust Fund mentioned briefly by Bappenas as something they seek to explore with international donors.

Appropriateness to contractors

54. Local and national engineering contractors were the primary route to obtain the mechanical equipment necessary to build the interim and modern landfills, clear agricultural land and demolish damaged buildings. Their businesses benefitted considerably from the TRWMP. Whilst it was not possible to meet contractors during the field visits in Aceh, on Nias Island field engineers from the landfill construction contractor were met at the Teluk Belukar site (Gunungsitoli district). They said the terms of reference, designs and contract requirements were clear, although the construction timetable was very tight. Some contractors, particularly those involved in clearing agricultural land, were found to be performing sub-standard work. When this was detected the project team moved promptly to demand remediation or to terminate contracts and engage replacement contractors. The project team also noted when local demand for mechanical equipment was high the hiring costs demanded by contractors rose substantially.

Effectiveness

Effectiveness: the extent to which the intended results have been achieved. This includes an assessment of cause and effect - that is, attributing observed changes to project activities and outputs

Review of site visits during all three phases

55. The evaluation mission, coupled with the two mid-term missions, visited twelve out of thirteen beneficiary districts (Simeulue was the exception) and undertook a critique of the work of the Project team, local administrations and partners. The project team gave their views freely on the strengths and weaknesses of each situation and the examples of clearance sites; land disposal facilities and recycling ventures visited were regarded as representative of the full breadth of the work underway. A record of the site visits undertaken by this evaluation mission is presented in Annex 4.

Effectiveness in addressing the Development Objective

56. The Development Objective was: *To improve and sustain the environment of Aceh and Nias [Island] through; (a) strengthening the capacity of local government to conduct effective efficient collection, recovery and disposal of municipal and tsunami waste; (b) rehabilitation of critical waste management infrastructure; and (c) supporting local enterprises in the creation of livelihoods opportunities in recovery, processing and recycling of waste, and clearance and rehabilitation of tsunami impacted agricultural land*, was orientated in its early years by 'volume'. The project team were rightly proud of the volume of outputs delivered for land area cleared, quantities of waste better handled, number of jobs created after the tsunami, number of waste staff trained and increased employment stimulated from waste recovery businesses. Efforts to examine the measurement of effect and success in terms of 'impact' issues such as demonstrable changes to individuals' lives, communities' expectations and governmental capacity came in later years.

Effectiveness of land and debris clearance

57. The assessment noted the extensive scale of the work undertaken by the Project is impressive and most was completed in Phase 1. It was noted when reviewing the reports on activities delivered, when taken together, they had produced an extensive and practical set of improvements across the eight original districts. During Phase 1 the project team committed considerable management and field time to ensure the clearances works were completed and land was ready for reuse. A key feature was the substantial sum (US\$ 8.4 million) allocated for contracting heavy equipment. This gave the TRWMP team the flexibility and capability to resource properly each clearance activity. The expertise built up by the project team through demolishing safely 553 unsound buildings was also called upon to organise the demolition of the damaged Banda Aceh water tower: a major concrete structure inhibiting redevelopment of one part of the city.

58. It was noted the TRWMP had served to return to use approximately 254 ha of tsunami-impacted agricultural land with as estimated benefit to 946 households. A further benefit was the use of recovered demolition material as fill to restore 100km of roads and provide 55 hectares of daily cover at landfills. Large quantities of wood were recovered from demolished homes, much of it hardwood. Through the carpentry skills training work at Gampong Jawa 12,000 units of wooden furniture were manufactured. The effectiveness of this aspect of the Project has been demonstrated.

Effectiveness of clearance of drainage channels and mobilisation of labour through cash for work

59. These tasks were seen by communities as very important sources of income for tsunami-affected people in the immediate months after the disaster. Hundreds of people were mobilised during the 2005 to, amongst other tasks, clear drainage channels and sweep streets in various towns. In the monsoon climate of Aceh and Nias Island, clearing this drainage before the onset of the next monsoon season was seen as a priority to return further disruption from flooding and the associated elevated public health risks. Whilst a little publicised aspect of the TRWMP, the assessment team regarded the work as an effective contribution to the Phase 1 objective of 'recovery'.

Effectiveness of generating new livelihoods from waste recovery and the use of NGOs

60. The use of the NGOs as executing agents for this component of the TRWMP was viewed as the correct approach. The TRWMP project team was viewed, in general, as having only a limited community engagement capability. The collaboration with NGOs, well established within towns and districts, was likely to have been a key reason for the very effective results found from the livelihood activities. This conclusion was drawn from the findings in the two independent livelihood assessments, meetings with recyclers during field visits and the volume of assistance disbursed.

61. The first livelihood assessment concluded that *“the expansion of projects stimulating new livelihoods from waste recycling has been a positive development”*. Learning from the experiences of Phases 1 and 2, the second TRWMP midterm review suggested a tighter approach to selection of future livelihood projects, in particular that *“support should be targeted towards livelihoods projects that recover materials from municipal solid wastes (MSW) that would otherwise require public funds for their collection and disposal”*. This recommendation was endorsed by UNDP and its ensured greater focus on MSW during Phase 3. The second livelihood assessment summarised the extent of the assistance provided for all activities between 2007 and 2011 (Table 2).

Table 2. Overview of livelihoods from wastes beneficiaries in each district

A graphical representation of this information is presented in Annex 8)

Type of Beneficiary	# Projects ¹				Value (\$USD)	Process / Waste Materials Involved
	Total	Austcare	Y-CAP	TDH-I		
SMEs	164	45	84	35		Some or all of the following: <ul style="list-style-type: none"> Waste² collection, sorting, processing (compacting, shredding), and resale to larger waste traders locally or agents in Medan.
Individuals	36	-	8	28		
NGOs	12	11	-	1		<ul style="list-style-type: none"> Composting of animal, agricultural and kitchen waste. Processing of coconut husks to

¹ A small number of beneficiaries were supported by both Austcare or Y-CAP and TDH-I (i.e. in both Round 1 or 2 and Round 3). These are recorded in project data against TDH-I only to avoid double-counting.

² Data from TDH-I showed that amongst their 35 SMEs metal is the major material collected with around 52% of the total, followed by plastic 14%, paper/card 12%, glass bottle 12%, aluminium can 7% and others 3%.

Type of Beneficiary	# Projects ¹				Value (\$USD)	Process / Waste Materials Involved
	Total	Aust - care	Y-CAP	TDH -I		
						provide baled coconut fibre for industrial use. <ul style="list-style-type: none"> • Generation of biogas from animal waste. • Production of handicrafts from waste materials. • Production of detergent from rice straw. • Capacity building of waste collectors.
Groups	10	-	9	1		<ul style="list-style-type: none"> • Manufacture of oil lamps from metal cans. • Mushroom farming using agricultural waste (rice straw) as a growing medium.
Cooperatives (<i>koperasi</i>)	3	2	1	-		<ul style="list-style-type: none"> • Furniture-making from tsunami waste wood. • Production of products from waste tyres.
Schools	8	-	-	8		<ul style="list-style-type: none"> • Segregation of card, metal and plastic in School Garbage Banks (SGBs). Sale to waste collectors. • Environmental education.
Total	23 3	58	10 2	73		

Source: Brooks, N. (2012)

62. The final evaluation team also noted from the sector assessments and project team data:

- 164 SMEs were created and/or supported, of which 109 SMEs are still in business after three years of support
- Eight School Waste Garbage Banks help teach children about recycling and earn income for school activities
- 2,400 (36% females) people were employed through the SMEs, with an indirect benefit to 11,800 indirect beneficiaries (54% females)
- Equipment worth US\$ 1.37 million (baling presses, safety gear, motorcycles, etc.) was distributed
- Small grants to a cumulative value of US\$ 1.34 million were distributed
- 72,000 tonnes of waste recycled; 67,000 tonnes of recycled material successfully sold in the market during the period of TRWMP support up to its completion in 2011.

Effectiveness of the interim landfill activities

63. In parallel to the interim landfill engineering within districts, the impact of the tsunami required the clearance of over one million cubic metres of waste in urban areas. A sizeable proportion of this waste required disposal to land. Consequently, upgrading the disposal capability in districts from the universal method of open dumping in wetlands and along roadsides was a sensible and responsible approach to be included in the Project. The interim landfill programme of work was a major investment in the disposal infrastructure during Phase 1. Interim land disposal was upgraded in eleven districts. The combined surface area of these new waste cells was 26 ha. It was also noted in some places a routine waste collection and disposal service was introduced for the first time. Consequently, the coverage of waste services across the districts assisted has risen from 67,000 properties (2006) to nearly 140,000 (2011). This data was compiled from a survey of district waste departments.

64. The first and second mid-term assessment teams visited several of the new landfills and found those in use or nearing completion to be of a good environmental and engineering standard. Each site was designed by the project team to provide a better, more environmentally sympathetic waste disposal for interim periods of between 2 to 5 years. The Project has also been assisted by the widespread availability of thick deposits of clay soils, which have been used to line sites to isolate wastes from the underlying geology, provide top cover to reduce rainwater infiltration and construct lagoons to contain leachate for treatment.

Effectiveness of the waste training programmes in raising skills, capacity and confidence amongst local waste management staff

65. The Capacity Building component was designed to build capability within the district and provincial government sanitation departments to plan, operate, maintain, manage and finance sustainable solid waste management services and infrastructure. Under a LoA with UN-HABITAT, a package of training on the operation and maintenance of the sustainable waste management systems in line with the national law UU No. 18/2008 was provided to the waste management department staff and officers, as well as other district stakeholders such as Bupati, provincial secretary (Sekda), parliament members, Bappeda and district bureaux of legal affairs for a combined period of more than 30 months up to September 2012. The key strategy of the training included a 'Training of Trainers' element as a means for the transfer of knowledge and to sustain a training programme in the future. In early 2010, TRWMP launched its training in partnership with UN-HABITAT. Overall, the evaluation mission judged the Project made a positive contribution to the enhancement of financial and technical capacities for sustainable waste management.

66. The project team advised a high number of people (c. 1600) attended some or all of the capacity building workshops, of which 9.5% were female, but it is unclear the level of skills-raising and confidence-building achieved. It was not possible to evaluate the effectiveness of the waste training programmes and there is a risk some expectations from the Project will not be fulfilled. When questioned during site visits, some waste managers, particularly in more rural places, claimed to be unprepared or not confident about operating improved landfills. It was also observed at Pidie and Bireuen, where two new engineered landfills opened recently, waste emplacement was chaotic. Waste managers promised to rectify the situations when they get further mechanical equipment. This seemed a somewhat open-ended promise and requires follow up. The UN-HABITAT set of solid waste management training materials for municipal sanitation staff is a remarkable achievement and worthy of wide dissemination and use in other places.

67. The Project has sought the national accreditation of the 18 training modules to certify the

competency achieved by successful participants. It was expected the accreditation and certification would guide the district government on staff promotion and staff placement in order to retain knowledge and reduce the efforts necessary to continually train new staff. Certification was expected to bolster a participant's position within solid waste management and give confidence as a certified specialist. By the last month of the Project the accreditation and certification effort made by the UNDP did not appear to have been successful.

68. Interviews at five locations (Kota Banda Aceh, DK3, Pidie, Bireuen and Gunungsitoli) with training participants during the evaluation mission found most participants had positive comments regarding knowledge and skills they had learned during the training. Participants gave different responses as to the extent they changed their behaviour back in the workplace as a result of the training. Two main factors were behind the differences of their response, that is, whether there are landfills in their district and whether their positions are still related to waste management. This is especially true to participants of Module C - training on strengthening technical capacity. Participants from the three districts where new modern landfills had been constructed and whose roles were still related to waste management work, generally had positive comments, while those from districts that did not receive new landfills were more ambivalent. In Gunungsitoli, for instance, interviewed staff from the waste management department mentioned that they could not apply what they got from training because there was no landfill yet in their area.

Effectiveness in budgeting and cost recovery

69. The training module on Budgeting, Accounting and Financial Management is believed by the project team to have contributed to an increase in yearly budget (APBK) for many district sanitation departments. This increase was attributed to the key people in the district administrations becoming more aware of both the importance of adequate funding and the acquisition of more technical knowledge on how to appropriately plan for, advocate and receive budgets from provincial government.

70. In the efforts to increase financial sustainability of solid waste management, the Project assisted in the legislation of cost recovery for waste services. The Project supported the drafting of two solid waste management qanuns related to UU No. 18/2008 in Pidie and Aceh Utara districts. TRWMP also provided technical support for the development of qanun for fee collection in other districts. This qanun serves to legalise cost recovery for SWM services which should add much needed funding to district annual budgets for solid waste management.

71. The general financial sustainability of the district government sanitation departments during the course of the TRWMP appears to have improved. In 2011, target districts received 230% more in government funding for waste management budgets than pre-UNDP/post tsunami conditions. There has also been improved awareness regarding the importance of budgeting for solid waste management, and participants of TIM-SWM are now more aware of the detailed requirements necessary for a successful budget application. In 2011, waste management departments received 70% of the funds requested for operations and administration, compared to 65% in the year before.

72. TRWMP has also endeavoured to establish cost recovery mechanism for long term sustainability of solid waste management. Pilot projects for user fee recovery have been implemented in 82 villages with the number of households involved in waste fee recovery schemes estimated to be over ten thousand. The number of households that actually paid their user fee was 11,506. Within the pilot project areas it was reported an average of around 10% of households

paid for solid waste services, although this figure is low it masks a varying degree of effectiveness in fee recovery between different localities.

73. During the period 2004 (pre-tsunami) to 2011 the number of households across all districts receiving a waste collection service and paying waste fees to the district increased 10-fold to an estimated 27,000 properties. The number of business contributing to cost recovery through waste fees rose 50% to almost 13,000. The stimulus to waste management created by the TRWMP was probably influential in a greater recognition by the public that improved waste services are possible and can be sustained. The amount of fees recovered still only represents a small fraction of the total cost of waste services and the coverage of a waste service to households is still relative low in some districts, but it is acknowledged positive steps have been achieved.

Effectiveness in engaging with communities, local legislatures and political leaders

74. Engagement at all levels in communities is vital to the longer term success of the TRWMP Phase 3 objective to establish a lasting waste management infrastructure. Engagement with communities on the materials recycling work has been widespread and would have contributed positively to the expansion of recycling activities. The statistics provided by the project team, from its three NGO partners, suggests awareness raising on the opportunities for waste reduction and recycling has reached potentially 36,000 school students. Some caution is required when interpreting such a figure but it does underlie a large effort was made to promote waste recovery activities. The authorities in Banda Aceh estimate 50% of all residential and commercial solid waste is recycled before it reaches the municipal system for land disposal. Engagement with communities on waste management and disposal is less well documented and was probably weaker. The work with the eight school garbage banks offers hope of creating a further momentum within the youth generation for recycling and higher waste management standards.

75. Engagement with political leaders was part of the standard approach to preparing for projects in each district. Nevertheless, the crucial tests of impact by the TRWMP with local political leaders are: 1. The strength of political will to put capable waste personnel into senior roles in district waste management departments and to avoid being swayed by other considerations; and 2. Their willingness to engage within the legislatures to introduce qanuns to tighten local waste management rules and introduce or increase the fees recovered from residents. Beyond Kota Banda Aceh the recent reported actions of leaderships has been encouraging in some locations (e.g. Pidie) and less so elsewhere (Bireuen and Gunungsitoli).

Effectiveness of the sanitary landfill developments

76. The second TRWMP mid-term assessment helpfully summarised the effectiveness expected from the development of demonstration sanitary landfill sites at four locations:

'This is the largest component in terms of financial contribution. The achievements made during the second phase of TRWMP were considered against the benchmark of the extent to which activities introduced and reinforced the concept of increasing control over the handling and disposal of collected wastes, i.e. small, incremental increases in controlling waste lead to better waste management. Each new measure may be small but over time the cumulative effect can be impressive and confidence-building. Examples of increasing control [observed] for waste collection included maintaining a regular service, providing more bins along a collection route, subsequently expanding collection to more places, washing the collection vehicle at the end of each day and increasing the working hours of a vehicle to get better cost-efficiencies. For disposal, the simple measure of having a gatekeeper or tip marshal with

the authority to direct waste to be deposited in a small working area immediately reduces the indiscriminate nature to land disposal. Introducing manual landfilling at smaller sites and getting both site and office staff to develop a tipping plan on sequence by which a landfill will be filled can engender a sense of greater control over the way a site will be operated.'

77. Completion of the construction of the landmark Blang Bintang Regional Landfill for Kota Banda Aceh and Aceh Besar and the construction of sustainable permanent landfills in three further districts (Pidie, Bireuen and Gunungsitoli) will conclude the physical implementation of the sanitary landfill activities. Further TRWMP achievements were the construction of the public service vehicle workshop and the supply of specialised waste management equipment for the Gampong Jawa Landfill.

78. Technical assistance to the district waste management departments was also provided through joint work, with consultants, to prepare ten Environmental Impact Studies on landfills and eight feasibility studies, site surveys and detailed engineering designs for sustainable permanent waste disposal facilities at nine other districts (These are the designs expected to be taken forward in a future national programme by the Ministry of Public Works). A list of the interim and engineered landfills constructed by the Project is presented in Annex 9.

Effectiveness of Phase 1 outputs, taken from mid-term assessment in January 2007

79. The paraphrased Phase 1 objective was to focus on providing a coordinated, pragmatic response to the public sanitation and environmental concerns associated with tsunami/earthquake debris clearance and the management of municipal solid waste. NGO support was also mobilised to stimulate the creation of livelihoods from the recovery of materials from municipal waste.

80. The first mid-term assessment team was impressed with the achievements made. It concluded the TRWMP was designed correctly to contribute to the essential needs across Aceh and Nias Island relevant to free up land for economic reuse and social recovery and provided the basic public sanitation service necessary for contemporary communities. More specifically it found:

- Almost all of the urban land clearances and building demolitions had been completed and extensive agricultural land clearance was underway or scheduled at specific locations. The completed sites had already released large areas of land for productive agriculture and aquaculture, social use and rebuilding (then 705 ha).
- New interim waste disposal facilities ('controlled sites') had been constructed from local resources to acceptable engineering and environmental standards in each district. The sites were an improvement over previous uncontrolled dumpsites and had the potential to be locally maintained and operated. They conformed to sites in the second tier of the 'standard' classification of landfill operations*. Across the districts visited these sites were estimated collectively to serve a population at the time of around 450,000.
- New waste collection, street sweeping and drainage clearance services had been put in place in Banda Aceh and other towns. They had visibly improved the cleanliness of communities and reduced the likelihood of waste-related communicable diseases in the aftermath of the natural disaster. By late 2006 the TRWMP was supporting the manual sweeping of 23 km/day streets and had unblocked an estimated 1053 km of drainage channels.

- Cash for work schemes the TRWMP employed temporary workers from displaced communities. Up to 1746 temporary workers were employed each day and whilst representing a short term distortion to normal, affordable working patterns, it was regarded as a practical approach to provide an early source of income following the breakdown of the local economy. Temporary employment of day-workers ended in 2008.
- Innovative waste recovery opportunities were piloted, in particular furniture making from tsunami waste wood. This led to 65 new carpenters being trained with the practical skills for independent livelihoods.

Effectiveness of Phase 2 outputs, taken from mid-term assessment in December 2008

81. The Phase 2 objective was to focus upon enhancing the local government capacity in coordinating the reconstruction process. Both were in line with the Master Plan for Rehabilitation and Reconstruction of Aceh and Nias. This objective had the effect of making the measures of success more challenging. In a departure from Phase 1 the measures were not largely based on the volume of operations undertaken and completed. Further support was also provided to promote sustainable livelihoods through waste management. The second mid-assessment team found many of the TRWMP achievements in livelihoods development remained largely unpublicised and successes achieved by the programme needed to be promoted more effectively. They suggested the management of existing and future livelihoods projects should be tightened to increase local effectiveness:

- Performance measures should be established at the outset of a livelihood project to define when a 'successful outcome' has been achieved and TRWMP can exit from the activity. There was a risk support would be continued for some schemes that were able to support themselves
- The monthly review of all livelihoods projects by the TRWMP team should be tightened to include a rigorous case by case assessment of their progress towards achieving the successful outcome defined at the outset of TRWMP support
- A livelihood project receiving TRWMP support should have the potential for many individuals to achieve an income from recycling components of municipal solid waste. Small schemes benefiting only one individual or family should be phased out
- A livelihood project should have an identifiable leader who demonstrated a business interest to organise the recycling activities and possessed the desire to expand and diversify when opportunities arose
- A livelihood project should be encouraged to pursue opportunities to produce value-added recycled products (e.g. rope, bags, pellets, mouldings) to maximise income for the enterprise, rather than simply collecting raw materials for others to process elsewhere (such as in Medan)
- The opportunities for other individuals, groups and communities to replicate waste livelihoods needed to be more widely communicated and proactively promoted by the livelihoods NGOs
- The livelihoods contractors, working with the project beneficiaries, should broaden their training to include more on marketing, product design, business skills and financial management.

82. The second mid-term assessment found the engineering aspects of the waste management improvements were progressed well and encouraged the project team to pay more attention to

other systematic failures that affect waste services in other economically-developing countries. This was suggested to be a first step towards breaking the mind-set within individual districts that they must be fully self-sufficient in waste collection and disposal irrespective of the:

- Cost – the level of finance available in most districts in Phase 2 was inadequate to operate improved waste services
- Collection inefficiencies - often equipment only works for a short time each day as there may be insufficient waste or collection coverage to keep vehicles and personnel fully occupied
- Disposal inefficiencies – districts may have disposal facilities close to one another but insist on operating them separately. The clearest example is the open dumps operated by Lhokseumawe and Aceh Utara, which are only ~300m apart on either side of the district boundary line
- Technical capabilities – the technical capacity to operate improved waste services within individual districts is drawn from a small and limited pool of talent
- Availability of equipment – often only small numbers of collection vehicles, containers, heavy equipment and support equipment are available in a district, with little or no back up to cover for unplanned breakdowns.

Effectiveness of Phase 3 outputs, from this final assessment in 2012

83. In Phase 3 the objective changed from disaster recovery to improve and strengthen essential services for the longer-term development of waste management infrastructure and operations; capacity building of local government sanitation units; creation of sustainable livelihoods in waste management; and safeguarding the environment. The principal features of this work performed are consistent with this objective:

- Each of the thirteen districts had pre-feasibility waste management studies undertaken by contractors (Meinhardt)
- These were supplemented by the work of further contractors (Riley Park Hayden & Associates (RPH) and Sogreah) in 2009 who produced detailed waste landfill designs, waste strategies and environmental reports (the so called 'full package landfill designs') for each district or combination of districts (e.g. Kota Banda Aceh/Aceh Besar and Aceh Utara/Lhokseumawe)
- It became apparent there would be insufficient finance to construct a modern engineered landfill for every district. A selection process was devised to identify four locations where the construction of new landfills offered a high likelihood of being operated to a modern standard in the future by the district administration. A site prioritisation exercise developed a set of 'readiness criteria' on the identification of the locations with the most pressing waste management and public health needs. These were agreed by the project team at national level with the Ministry of Public Works and Bappenas.
- Nias Selatan district was dropped from the Project in 2010 due to its lack of constructive engagement with TRWMP and an absence of assurances future landfill practices would be improved and local budgets would be increased.
- The four sites were selected in 2010 from an evaluation of the readiness criteria. These were Blang Bintang (for Kota Banda Aceh and Aceh Besar); Pidie; Bireuen; and Gunungsitoli
- The remaining districts were invited to submit their full package landfill designs to the provincial government and, in turn, to the national Ministry of Public Works for consideration for inclusion in a major Government of Indonesia investment in landfill

- development between 2013 and 2017, known as the Accelerated Infrastructure Project.
- Between 2011 and early 2013 the four sanitary landfills were constructed and opened (or to be opened). Considerable land, financing and contracting delays were encountered and overcome by the project team during 2011 and 2012.

Efficiency

Efficiency: how economically resources or inputs (such as funds, expertise and time) were converted to results

Overview of expenditure

84. The Project was funded in three phases with a total provision of a US\$ 39.4 million grant from the Multi Donor Fund for Aceh and Nias (MDF). TRWMP also received a contribution from the French Red Cross for the amount of US\$ 550,000 and consequently, the total donor budget for the TRWMP was US\$ 39,996,208. UNDP also reinvested windfall bank interest received from donor funds of almost \$1million into project activities, which resulted in around US\$ 41million being available for disbursement. The MDF required detailed financial records to be compiled and this was managed by a member of the project based in Jakarta. The records appear to have been compiled methodically and budget and expenditure information were reported regularly to the principal donor.

85. The project expenditure by phases were:

Phase 1	US\$ 14.4 million
Phase 2	US\$ 8.6 million
Phase 3	US\$ 18.3 million

86. Overall, the distribution of project expenditure by phase was observed to rise to peak expenditure in the third phase and reflects the commitment to the infrastructure construction activities in accordance with the work plan. It is noted the timing of some of the larger capital expenditures was much later than expected due to protracted negotiations and preparations within districts and design delays by TRWMP contractors.

87. The expenditures were not audited in this evaluation but they appear proportionate when considered against the large programme of work undertaken over the seven-year lifetime of the project.

Expenditure by component

88. A useful indication of the distribution of funds across each of the four Project Components is presented below:

Component 1 - Local government capacity building and land clearance	US\$ 18.7 million
Component 2 - Livelihoods rehabilitation and creation	US\$ 3.6 million
Component 3 - Regional and district landfills	US\$ 16.4 million
Component 4 - Management, monitoring and oversight of the Project	US\$ 1.4 million

89. Component 1 had the highest aggregate expenditure (US\$ 18.7million) accounting for 45% of

the total expenditure in the Project of US\$ 41million. Almost two-thirds (US\$ 11.5million, 61%) of the Component 1 expenditure was for heavy equipment hire necessary to implement debris clearance from agricultural and urban areas and for the demolition of buildings. A further 15% (US\$ 3 million) was spent on cash for work schemes and the remainder on supporting local capacity and skills training. Both the heavy plant and cash for work expenditures mostly occurred in Phase 1, which is consistent with the objectives to assist in recovery activities in the immediate aftermath of the disaster. Expenditures on Component 1 activities were considerably lower in Phase 2 and 3.

90. Component 2 was the lowest in aggregate expenditure at US\$ 3.6 million (9%) with a gently rising rate of spend over the three phases. The principal constituents of this expenditure were disbursements to the contracted activities undertaken for the TRWMP by waste livelihoods NGOs.

91. Component 3 displayed the reverse expenditure profile to Component 1. The aggregate expenditure for Component 3 was US\$ 16.4 million with the most substantive expenditures being in Phase 3 (US\$ 13.4 million, 82%) for the design and construction of the four sanitary landfills. Direct expenditure on the design and construction of the interim landfills in Phases 1 and 2 was around \$3 million. There was also some cross-support whereby the use of some heavy equipment was already accounted for as land clearance expenditure in Component 1.

92. Component 4 related to the internal management of the Project including Country Office oversight. This accounted for US\$ 1.4 million over the lifetime of the Project, a little over 3% of the total project cost. If this is the full cost of Project Office and Country Office management and monitoring then the cost is modest in comparison with high value development projects elsewhere. It was noted a further average sum of US\$ 171,000 per year (known as the GMS) was levied on the project funds as a UNDP overhead contribution to the running costs of the Regional Office (Bangkok) and Head Office (New York).

Efficient use of project staff and reporting (i.e. the Component 4 activities)

93. The motivation of project team was very high and sustained over the project lifetime except towards the end of 2012. Around this time important members left the team and the remaining staff had to take on additional burdens at a time when the completion of some activities was not proceeding smoothly. This situation eroded motivation. The staffing numbers were mostly below 20 personnel. The staffing levels appear proportionate to the volume of work and were varied each year as individual activities came to an end. The highest number of staff was in 2011 when the implementation of the four sanitary landfills was at its most intensive. It was noted in the mid-term assessment in 2008 the experience and gravitas of the Project Assistants working remotely in the field offices was variable. The work of a Project Assistant in the field is essential and recognised by the evaluation team to be a lonely and difficult role. Whilst they were generally effective in building up strong working relationships with technical personnel, some found it difficult to gain the confidence of senior managers and locally elected representatives in some districts. This is likely to have been a contributing factor to the less than expected final outcomes in some districts.

94. Formal project management disciplines were employed to programme the delivery of individual activities, define the route to delivery, negotiate within the constraints of the prevailing conditions to obtain value for money, monitor progress and intervene when problems arose.

95. Overall, the evaluation team found the level of reporting and detailed documentation

produced by the project team on each aspect of the project was substantial and relevant to the technical nature of the work undertaken. Quarterly and annual progress reporting to the MDF and national counterparts was sufficiently informative to gain a realistic understanding of the status of the project implementation and rate of expenditure at that time, though it was noted the reports were not always prepared by their due date. In mitigation it was noted reporting requirements were quite demanding and the quarterly report in particular was a detailed document to prepare.

Efficiency in procurement

96. A continuing issue has been the timeliness of the progress and completion of the procurement procedures. The centralisation of this function in Jakarta has at times created a mis-match between the needs of the Project to progress to deadlines and the inflexibility of the UNDP's procurement policy and procedures applied globally, particularly for civil works. It was observed the traditional procurement procedures were orientated to technical assistance activities and equipment purchase. They were not well designed for the timely approval, or delegation of authority to approve, for high cost civil engineering contracts. It took time for all concerned in their tendering and approval to become comfortable with the requirements of this form of contract. Contracts of this nature can be over \$1million and include clauses and concepts normal to engineering works such as contingent liability and liquidated damages. There was clearly caution within the UNDP system over agreeing these contracts and becoming comfortable with the responsibilities they entail.

97. The evaluation found infrastructure contracts were a new experience for the Country Office and presumably other parts of the wider UNDP administration to manage and appreciate the particular nature of the requirements and safeguards that should be included in contracts of this nature. The Country Office showed leadership in taking forward discussions with its regional and headquarters counterparts involved in procurement. The standard General Terms and Conditions of Contract (GTCoC) used by UNDP were found to inadequately address civil engineering works and were not in line with current international practice as referred to by FIDIC - (International Federation of Consulting Engineers). It was concluded the UNDP GTCoC needed to be supplemented, so some components of the FIDIC GTCoC (known as the Harmonised version for Development Agencies) were incorporated as supplementary conditions of contract. This took time to resolve but appears to have been a pragmatic way forward. It is also understood the experience from the TRWMP is being used in New York to further refine UNDP's global procurement policy for engineering works.

98. It clearly took time to gain experience and a degree of familiarity with engineering contracts and to find a way ahead to engage local contractors on a timelier manner. Towards the end of the Project clearances for high value contracts were occurring more quickly, in one case a \$1.3 million contract was approved through New York in two days. In the earlier years it is understood this issue was a source of friction between the project team in Banda Aceh and the UNDP administration in Jakarta. The mission was pleased to note that with perseverance and understanding within the UNDP common sense prevailed and all of the contracts necessary to implement the project activities were eventually put in place. A larger delegated financial approval limit from the regional office or headquarters and more flexibility on restrictive tendering, in defined circumstances, might have speeded up in some cases the completion of contract negotiations and commencement of field work.

99. It was noted that in at least one incidence a TRWMP consultancy (Meinhardt) was very late in delivering pre-feasibility studies and landfill designs. Delays against the original timetable of up to

two years were reported. The project team in this case was probably too generous in its tolerance of late delivery and should have terminated the contract sooner. It is understood the two replacement engineering consultancies completed the work more promptly.

Use of LoAs

100. One aspect of 'contracting' that worked well locally through the project office in Banda Aceh was the Letter of Agreement (LoA). This was used throughout the Project to agree with a district administration or other public body tasks and disbursements which in effect permitted the project team to agree with local contractors to initiate work. The LoAs were used effectively by the project team to monitor the progress of work and it is acknowledged the team were prepared to withdraw or amend them with necessary to achieve the correct delivery of an activity. In particular, the LoA approach was claimed to have speeded up the local mobilisation of equipment and services for land and debris clearances and some landfill development works.

Value for money

101. The evaluation was not resourced to undertake a detailed examination of the value for money achieved by the project team. In recognition of the extensive range of physical achievements completed by the Project over seven years and the need to mobilise mechanical equipment quickly in Phase 1 to facilitate the post-tsunami recovery, the total expenditure and its distribution between the project components appears reasonable. Project team members mentioned that rental rates for mechanical equipment, at times, varied significantly, but they tried to contain costs by careful scheduling of implementation. The project team's ability to conclude the UN procurement procedures with Country Office and finding sufficient competitive bids caused uncertainty and tensions during some stages of delivery. Without doubt these difficulties caused delivery delays and was probably one contributing factor leading to the request for No Cost Extensions (NCEs). In some cases, e.g. construction of the Teluk Belukar landfill for Gunungsitoli, few contractors wanted to bid or had the capacity to do so. Consequently, the ability to demonstrate the achievement of best prices in all circumstances was not possible.

Impact

Impact: changes in human development and people's wellbeing that are brought about by development initiatives, directly or indirectly, intended or unintended.

102. The most visible impacts from the TRWMP to the general public were in Phase 1 when huge volumes of debris was being removed, cash for work was providing direct incomes and tracts of land were being cleared for farmers to grow crops. In all of these matters there has been overwhelming praise from members of the public, manual workers, public officials and collaborating organisations. The large and extensive nature of the delivery task touched many communities and the work has reflected well on the UNDP.

Specific impacts in agricultural communities

103. The clearance of agriculture land in three locations visited by the evaluation mission in Aceh Besar and Aceh Jaya was reported by villagers to have had a significant positive impact on their communities. Accumulatively, hundreds of farmers and their families had regained access to their land and the opportunity to re-build a livelihood. Some economic data was obtained during the

field visits by the mission and presented in Annex 4. During the site visits there was praise for the level of participation sought by the TRWMP project assistants with villagers to identify the locations to be cleared, identifying the farmers who would benefit, planning the programme of work and arranging for approvals from the local government and gaining the from the Agriculture ministry to provide seeds and advice once the land was cleared. After problems in two villages, where the first contractor was not clearing land according to the agreements and there was some anger amongst village leaders, the project team moved to replace the contractor and restore the understanding with the farmers who were impatient to return to their land. Livelihoods have been improved recently too, helped by the rising price of the wholesale price of rice, and farmers mentioned they have been able to accumulate some cash reserves to hire in equipment, improve the quality of life for their families and pay for better education of their children.

104. The case study from Aceh Jaya mentions post-tsunami incomes have doubled:

Case Study 1: Kareung Ateuh, Indra Jaya subdistrict, Aceh Jaya

After land clearance by TRWMP rice productivity is ~1.7 tonnes/hectare (equivalent to an income for milled rice of Rp 23.8million/hectare). Farmers acknowledged that this productivity is roughly the same as before tsunami. However, using the improved seeds supplied mostly from government assistance, they are now able to plant and harvest rice easily twice a year. In the period before tsunami they used to plant conventional varieties that could be harvested only after 4 to 6 months growing time. The collective support of the TRWMP and Agriculture Department has approximately doubled the annual income of farmers compared to that before the tsunami.

105. A fourth location, Munasah Masjid village where 37 hectares of land was cleared, was abandoned after one growing season. This was a disappointment. The project team believe the villagers have decided to undertake other employment but failed to admit to the TRWMP during the preparation stages. Nevertheless, the cleared land remains in the village as a resource that could be exploited in the future.

Specific impacts in waste recycling opportunities

106. It is undoubtedly profitable for most, if not all, of the continuing SMEs and other groups to recover waste materials and sell them to middlemen in Medan. The provision of standard equipment such as properly sized baling equipment can reduce transport costs and improve profitability too. There is a visible impact on the communities served by recovery schemes and the public and businesses appear undisturbed recycling businesses scavenge for waste. The second livelihoods assessment summarised the impacts in the community as:

- *Provided >US\$3 million support for waste management livelihoods activities.*
- *Supported 233 projects (SMEs, NGOs, groups, koperasi, schools and individuals), 170 of which are still active (73%).*
- *Benefited 429 individuals directly.*
- *72,121m3 of recyclable waste (MSW) diverted from landfill.*
- *An approximate total gross turnover of US\$18.5 million and net profit of US\$2.5 million*

107. In Phase 2 the livelihood programme reached the peak of it its activities across eleven districts. The work in Phase 3 was predominantly passive observation of the schemes by TRWMP Project Assistants allocated to liaise with individual districts, latterly Pidie, Bireuen and Gunungsitoli. Within the total number of schemes supported typically by training, the provision of

equipment (e.g. baling presses and motorised tricycles (*becaks*) and cash grants, there were 164 small business enterprises, 12 NGOs, 36 individual recyclers, 10 groups, 8 school garbage banks and 3 co-operatives. The three NGOs ended their direct involvement to the recycling schemes in 2010. Three years after TRWMP assistance ceased a follow up review in September 2011 found approximately two-thirds of the SME recyclers (109) were still in operation. The recycled products found to provide the highest return to the operators are PET plastics, cardboard, and ferrous and non-ferrous metals. It was noted several SMEs and groups were in existence before the tsunami, supplying recovered materials mostly in an untreated form to intermediaries in Medan, but the sizes of their operations and number of people employed directly and indirectly appears to have increased markedly.

108. Two illustrative examples, a successful new business venture and a school based waste recycling scheme, both generating revenue, were provided by the project team.

Case study2: Sulaiman Yacob (UD. Mandiri)

Before starting in the waste recycling business, Sulaiman Yacob (35) was a truck driver. He learnt about the recyclable goods business from his brother and after seeing the potential of other waste-pickers. His brother also introduced him to his boss: the bigger waste collector in Meureudu, Pidie. Sulaiman Yacob started work as a waste-picker in Meureudu in 2003. Initially his becak and business capital was provided by the local waste collector, and for that reason, Sulaiman was obliged to sell his recycled goods to that collector. At this time, Sulaiman bought recyclable goods with IDR 150,000 and sold them for IDR 250,000 (average value, depending on the type of waste): he also bartered for extra recyclable goods with basic plastic goods. Business grew as he received funding for a small warehouse and IDR 3,000,000 loan from the bigger collector, which he was able to repay in only one year. In 2007, Sulaiman went independent and received assistance from UNDP through YCAP for 1 becak, 2 scales and IDR 4,000,000 business capital. He also received training on recycling and financial management from YCAP. With this assistance, Sulaiman was able to become more independent, and stop being effectively 'tied' to the single larger collector for capital and sales. Sulaiman's business model was to increase his own pool of becaks and waste-pickers. Armed with the assistance from UNDP, Sulaiman initially bought (on credit) one unit second hand becak. He continued to buy second hand becaks until in less than 2 years he had 11 becaks (by the end of 2008). Afterwards, when TDH implemented WML Round 3, Sulaiman was shortlisted to received further assistance and received an additional warehouse, scales, pressing machine and two becaks. Currently Sulaiman has 26 becaks and 3 pickups, and extra land for further business developments. He sends the goods 3 times/month, with an average of 18 tonne/truck/trip. With the support of the TRWMP Sulaiman is able to support his wife and 5 children (3 of school age, 2 toddlers), and directly employs 5 workers plus the 26 waste-pickers with becaks.

Case study 3: SD 67 School, Banda Aceh

The TRWMP selected SD 67 as a recipient of its School Garbage Banks project, which trains students and teachers of the importance of waste segregation and recycling whilst cashing in on the efforts. The school was linked with a local buyer. The students are dedicated to the project and to the mission to save the environment at school and at home. Each classroom has two bins, organic and inorganic, and the children not only know what waste goes where, but they use them every day. Since it started in late 2010 the school has earned over 500,000 IDR, which it uses to buy school supplies. "We collect the garbage to keep the school clean," said 11-year old Cut Aura. "We also do community work on the weekends." Even the school cafeteria is a point of pride. Ibu Zurha owns the canteen "The kids eat and then they throw

out the garbage". Cardboard boxes line the floor next to the tables where the kids segregate their waste according to organic or inorganic material. After lunch, there's little left for Ibu Zurha to do but sweep up and prepare for tomorrow.

109. The breadth and continuing successful operations for the majority of the schemes is a very positive achievement by the TRWMP and has clearly created a stronger employment sector than existed previously.

Specific impacts in solid waste management

110. In normal times most waste management activities are out of the gaze of the general public. Typically, once waste is collected from households or the street, the public are unlikely to come into contact with it again unless some part of a waste collection system becomes unreliable or a serious pollution event occurs. Improvements to coverage and reliability of waste collection services reduce the contact risk from physical injury and waste-related infections (e.g. gastro-intestinal, eye infection, skin infection, rat-borne illness). It also increases the general cleanliness and wellbeing of a neighbourhood. The adoption of better engineered land disposal with leachate collection reduces considerably the potential pollution from high BOD (Biological Oxygen Demand – a measure of oxygen depletion in water samples) discharges to groundwater or surface watercourses.

111. A further impact on communities is the need to pay more towards maintenance of a more reliable waste collection service and better land disposal operation. This is too often not recognised by residents as an important payment to make for a public service. Arguably, the largest potential adverse impact to waste management is the poor recovery of waste disposal fees levied on households and businesses. Without sufficient cost recovery budgets to maintain a positive impact on the local community will be jeopardised. The improvements to communities and their environment could also be reversed if waste managers through cash shortage or lack of competence revert back to open dumping and do not continue to operate interim landfills or construct replacements to a higher standard.

112. The new TRWMP sanitary landfills are still relatively new. Pidie and Bireuen sites opened first and are described in Annex 4. Early issues with poor waste emplacement have been observed and the local waste management and municipal administration personnel have promised to rectify the problems. The regional landfill Blang Bintang has become a showpiece site design in Indonesia and should receive waste from the end of December 2012. Providing the capable management team is moved from the existing Gampong Jawa site to the new site disposal site, then it is likely Blang Bintang will be a successful operation. It was noted previous site at Gampong Jawa has been used as a reference site for other Indonesian waste managers and students. The fourth, new site in Gunungsitoli district has been seriously delayed. Construction work began in December 2012 and should be finished by June 2013. The assessment team was also concerned with future prognosis for this site due the lack of adequate budget, senior staff changes in the district and perceived weaknesses in waste management knowledge by managers in the sanitation department.

Sustainability

Sustainability: the extent to which benefits of the project continue after external development assistance has been withdrawn. This includes evaluating the extent to which relevant social, economic, political, institutional and other conditions are present and, based on that assessment, making projections about the national capacity to maintain, manage and ensure the development results in the future

Land clearance and skills training sustainability

113. The land clearance achievements are undoubtedly sustainable. This is because land clearance has enabled farmers to restart cultivation of their rice fields and, similar to the period before the tsunami, rice farming has now become their main livelihood. As mentioned by farmers during the evaluation mission, an increased income has been the result of doubling production due to the use of high yielding varieties provided by the Agriculture Department. This was appreciated by farmers, who cited the benefits as increased food security, building up their savings, creation of additional assets, and the ability to invest in their children's education. It was noted the average size of a sawah varied between villages: in Kareung Ateuh it was 1 ha per farmer; in Lamanyang around 0.6 ha; and in Lhoong, 0.3 ha. The focus now should be on reducing inefficiencies associated with traditional and subsistence farming practices.

114. In spite of the emergence of problems with the land clearance contractors in some areas, in general farmers were satisfied with the way the Project organised and worked with their communities to complete the land clearance activities. They said they had been genuinely involved in the planning and implementation and this had strengthened their support for the land clearance activities. At the same time, partnership and good working relationships with the Agriculture and Public Works Departments at the district level should have positive implications for the future agricultural development in the area. This relates to the appropriate government agencies having *tupoksi* (duties and responsibilities) for dealing with the development of rice cultivation.

Waste livelihoods sustainability

115. Sustainability in waste management livelihoods has been achieved, in all of the principal technical, environmental and financial/economic aspects. Technical sustainability is mainly related to the purchase, installation and use of equipment. During the evaluation mission, it was evident transport vehicles and equipment provided by the Project was mostly appropriate, easy to operate and spare parts were available locally. This is because some beneficiaries had been familiar with the equipment and the Project also gave training when providing new types of equipment to the employees who will use it. In summary, the technical sustainability is high.

116. Recycling is considered as good for the environment since it reduces the quantities of solid waste requiring transport and disposal and potential air or water pollution associated with land disposal are reduced. Where high waste diversion is being achieved then less land is required for waste disposal. However, the health-related underpinnings of solid waste management still need to be addressed. The minimal regulatory framework for environmental protection and occupational health and safety is generally not enforced at the level of people and businesses that operate in the recycling sector. A survey by TDH-I (2010) found that waste produced by the SMEs in the recycling sector are often burned openly or dumped nearby the working place. Occupational safety measures for workers are frequently ignored. Most recyclers operate without gloves or masks and with inadequate protection for their feet. Research in other countries (e.g. Romania) has shown waste workers are at high risk from infectious diseases and physical injury. Employers in the waste management and recycling sector do not typically provide washing and cleaning facilities for their workers.

117. The encouraging fact that most SMEs given support by the Project are still in operation and has proved that waste recycling is financially sustainable in most instances. Interviews with SME employers revealed there are still large quantities and dependable supplies that can be transported economically to their sites. There is also a dependable market in Medan for the processed material with relatively consistent prices. A typical example of a successful recycling SME was UD Mandiri in Pidie, which has developed from a small enterprise into significant profitable business with a net income of about IDR40 million per month. However, in Aceh, for several reasons, including the location of the highest population density and an almost direct link by road to Medan, recycling activities are more intense in the districts of Aceh Besar, Pidie, Pidie Jaya, Bireuen, Aceh Utara and cities of Banda Aceh and Lhokseumawe. All of them are located on the east coast of Aceh province.

Waste management infrastructure sustainability

118. The Project has made a unique and decisive contribution to achieve sustainable improvements in waste management in Aceh and Nias Island. The initial assistance to districts to recommence waste collection through the cash for work scheme led to routine waste collection becoming re-established in the tsunami-affected districts sooner than would otherwise have been possible. It is apparent these waste collection services have continued since the completion of the cash for work assistance.

119. The early emphasis in the Project towards establishing an interim waste disposal site in each district created momentum at a crucial point in time to encourage districts to abandon the use of open dumping. The considerable assistance provided in design, provision of mechanical equipment for dump closure, landfill construction and technical assistance to waste management departments established a network of engineered disposal sites. These provided around three years capacity for each district and were constructed with resources available locally. Whilst these designs should be technically sustainable for districts to organise the construction of further interim engineered sites, this may be difficult to achieve for most districts unless their technical confidence improves and sufficient budget is made available. Kota Banda Aceh's waste management operation DK3 is the most capable operation and it is within their capability to develop interim landfills. However, Banda Aceh has progressed beyond the interim standard of land disposal. They have successfully run and financed the operation of a more advanced land disposal site, provided through the TRWMP, at Gampong Jawa. This gives confidence for the expected sustainable operation at the new sanitary landfill at Blang Bintang, which started receiving waste in December 2012.

120. The sustainability of the other three sanitary landfills remains difficult to generalise. The waste managers and political will to support improved waste disposal is believed to be strong in Pidie, although the site when visited had only been receiving waste for two weeks and the quality of waste emplacement needed to improve. Officials from the sanitation department were confident they would improve operations once the rainy season ends. At Bireuen the site had been operating for four weeks and site operations were poor. Excuses were given by local officials why mechanical equipment was not on site emplacing the waste properly. The absence of sufficient budget to run the equipment was stated and this issue needs to be resolved before a firmer judgement could be made on the potential to achieve improved land disposal at the site. The prevailing situation at the sanitary landfill in Gunungsitoli is very uncertain. Its sustainability could not be determined because the site was still under construction. Discussions by the evaluation team with the waste management department were not encouraging. Several issues have to be

addressed including technical competence within the waste management department, senior management attention, the allocation of sufficient budget to operate the new facility well and the level of political interest to ensure waste cost recovery legislation is in place.

121. There is momentum at the national level to encourage districts to end open dumping. A waste management law was passed in 2008, although the implementing regulations were not passed until 2012. This law requires all districts to end the open dumping by 2014. This is seen as an optimistic deadline but it indicates the direction of travel planned by the national government. To assist the process the Ministry of Public Works are preparing an accelerated infrastructure project aimed at offering contributions to districts and regional governments to define their waste strategy and identify the land disposal sites to be upgraded.

122. The supporting work by the TRWMP provided each district with a package containing a local waste strategy, detailed landfill designs and an environmental impact assessment. This was intended to assist political leaders prepare and submit proposals for regional and national funds to implement improved landfill operations and comply with the new legislation.

Development and use of training materials

123. The Project undertook an extensive programme of training for waste managers, public officials and senior leaders in districts. A sound and relevant set of training materials was observed by the evaluation mission and earlier mid-term assessments. To introduce the construction of interim landfills the project team held practical training workshops on converting open dump sites to better operated facilities. The interim landfills were used subsequently to train waste managers on the proper use of mechanical equipment and introduce them to the underlying science and engineering to control decomposing waste and reduce environmental problems. In addition, a very good manually operated landfill was also demonstrated by the Project at Jantho but this low cost improvement over open dumping was not apparently promoted elsewhere.

124. In Phase 3 an impressive set of 18 training modules was prepared by UN-HABITAT. This set has specialist modules designed for senior officials, waste managers and financial and purchasing staff within districts. It is also relevant to civil and environmental engineers, academics and others interested in wastes management. The TRWMP modules were used in an extensive series of training workshops with participants from all twelve districts. Hard and soft copies of all of the modules were provided to each district as a permanent source of reference. The modules are well written and relevant to the waste management improvements sought in Indonesia. To ensure they are available for wider use across Indonesia UNDP should make arrangements with national bodies (such as the Ministry of Public Works and National Standards agency) to achieve certification for the training and its adoption at government public works training centres. UNDP may also wish to make them available to universities, websites for download and circulated to other countries in the region.

Political will and senior management at district, and provincial levels

125. A recognised and potentially serious risk to the sustainability of the waste management improvements advocated by the TRWMP is insufficient political will being shown by a mayor or elected members of the district legislature to give priority for funding new waste management operations. In Banda Aceh, where there was found to be active and enthusiastic support for the new landfill from municipal leaders, the new waste operations are expected to be sustainable. The Kota Banda Aceh and Aceh Besar administrations have, reportedly, allocated an adequate budget for the new Joint Secretariat for Blang Bintang. The city administration is also contributing a

knowledgeable waste management team through the inclusion of DK3 in the joint working arrangement. Some concern was expressed to the evaluation mission over the delay in filling the management positions at the Joint Secretariat. There was speculation municipal leaders were considering placing someone with no knowledge of waste management in the role as the Head of the Secretariat.

126. A related matter that risks the sustainability of waste services is the tendency in the public service to frequently change the head of the waste management department and personnel in other senior positions, often at short notice. This is disruptive to establishing consistent management practices and sustained support for the implementation of new initiatives and standards. It has been exacerbated in some districts by new managers having little or no knowledge or interest in waste management. UNDP should continue to discuss with the national government the establishment of a process to have waste management recognised as a profession in the same manner as say, sanitary engineers, architects and civil engineers and to make it a legal requirement for the head of a waste management department to hold this professional qualification. This is an approach used in various countries and has been regarded as a positive step in driving up the quality of waste management.

Community involvement and expectations of higher standards in waste services

127. The TRWMP committed considerable time and effort to improve the physical infrastructure for waste disposal and the capabilities of technical staff to provide a better standard of service. In parallel, these measures would be enhanced if there is wide and vocal support from the general public for better waste services. Strong public understanding and endorsement are often influential in securing adequate budget for operations and creating a sense of achievement and motivation amongst the workforce. There was no concerted programme within the TRWMP design for public consultation or education to be undertaken in each district before waste management improvements commenced. Therefore, longer term continued support from the public for a new minimum standard of acceptability for waste services has not been demonstrated, with the exception of the city of Banda Aceh.

Transfer of assets

128. The status of asset transfer is not yet certain and threatens the sustainability of landfill facilities through a lack of clarity over ownership responsibilities into the future. A resolution of this matter at national government level is still in progress and not yet completed. The reason appears to be a difference of opinion within the Ministry of Finance regarding the best way to deal with the transfer of assets. They have different interpretations towards the present regulation governing this matter. One interpretation is that asset transfer can be easily done because it is a grant managed through off-budget and off-treasury funding. Assets from a project such as TRWMP could be transferred just by using record of hand-over between the parties. However, there is also another interpretation, that the transfer of any assets with the value of more than IDR 1 billion requires approval from the President of the Government of Indonesia.

129. It is understood that the parties involved in asset transfer, including UNDP, are only slowly moving forward. The issue of unclear asset ownership and responsibilities have been the main reasons why many local governments and ministries have had their past financial accounts qualified by a "disclaimer" issued by the national financial auditing board. At the same time, local government is not able or reluctant to allocate budget for operation and maintenance of an asset until it is certain it is their asset. It would appear the decision on the way forward is now with the Ministry of Finance. The Bappenas role in this regard is to lobby at senior levels for a resolution.

130. The evaluation mission was made aware of two other UNDP programmes where asset transfers were involved: 1. Aceh Government Transformation Programme (AGTP); and 2. Technical Support to Rehabilitation and Reconstruction Completion and Continuation Coordination (TS-R2C3). Both evaluations highlighted asset transfer as a problem and the need to begin discussions with local and central government authorities far earlier in the project cycle. More specifically, the evaluation report for the TS-R2C3 programme in July 2012 found:

'Another important lesson from the TS-R2C3 experience is that work on asset issues and local government capacity building both need to commence earlier in the recovery process.'

131. Similarly, the evaluation report for the AGTP programme mentioned:

'Consolidation of asset transfer support has been a late addition to AGTP, despite this issue being raised as early as 2009 with implementation only starting in October 2012, and funding for major activities arriving in February 2012. Programme aims to have completed this by the end of AGTP were clearly not achieved.'

132. The two programmes included activities in Aceh to facilitate asset transfer and the responsibility of asset ownership and management. It is suggested the TRWMP asset transfer issues could have been included in the discussions with government authorities at the same time as for the assets under the TS-R2C3 and AGTP. Apparently, this did not occur.

Cross-cutting Issues

Gender

133. The TRWMP did not mainstream gender issues at the start of its activities. Specific comments on gender have been included elsewhere in the report. It was considered useful to draw together the limited information identified in this section.

134. The driving force behind Phase 1 was the urgency to clear debris, generate employment and to restart waste management by district administrations. No substantive information was found to show the involvement of women in the project activities was actively encouraged. A greater recognition of gender issues was noted, particularly through the NGOs responsible for livelihoods for wastes activities in the later phases of the Project. Only limited gender data was found by the evaluation team. In Phase 1 32% of the participants funded under the cash for work were women and it is not known how many women benefitted from the employment and training such as furniture making or from the clearance of damaged buildings and agricultural land.

135. A different situation was found by the NGOs working on the promotion of waste recycling livelihoods. They reported from surveys that 36% of the people employed by SMEs were women with an estimated 54% as indirect beneficiaries. An illustrative case study from Bireuen explains how one woman has established her own waste recycling business.

Case Study 4: Mrs Ibu Eva

Mrs Eva has managed her own waste recycling enterprise since 2003 with IDR 2 million as the initial capital from her husband. She also received assistance from UNDP through TD-IH. Her business employs three workers in a warehouse and four workers sorting collected recyclables. She also has built up connections with about thirty casual scavengers. Her business now operates eight becaks and she has a plan to buy truck when she has accumulated sufficient finance.

136. Waste management departments in the districts appear to mostly employ men for both manual and management roles. One exception noted was in Gunungsitoli where the new head of the sanitation department was a woman. The waste management training prepared by UN-HABITAT reported 9.5% of participants were women. This may be an encouraging sign for the future. The execution of the TRWMP landfill design and construction activities did not include any reference to promoting or targets to encourage greater female involvement.

137. It is speculated that the social and cultural acceptance of the involvement of women in waste management-related work may be different between Aceh and Nias Island. A similar observation has been made in other post-tsunami projects. In Aceh social expectations may dissuade women from seeking employment in this sector. Whereas on Nias Island the social conditions may be less onerous and women have wider opportunities to enter the public service and achieve management positions. There is no authoritative information offered to substantiate this suggestion but it could be considered further in a separate study.

Environment

Pre-tsunami impacts from MSW on land

138. Prior to the tsunami, the uncontrolled open dumping of solid waste was rife through Aceh and Nias Island. Every district dumped its wastes in unsuitable environments including on wetlands and along road sides. None of the sites in use had been prepared to receive waste and to reduce its potential to cause pollution. There were also descriptions of highly polluting leachates leaking from wastes, damaging watercourses and water supplies. Waste was also left exposed to waste-pickers and roaming animals and was often set on fire. There was little recognition from the districts that these practices were unacceptable and no discernible momentum within local government to change the status quo.

Measurements on environmental contamination from open dumping

139. The evaluation mission is unaware of any environmental monitoring of contamination from open dumps prior to the tsunami. The only information available was anecdotal but drawing on experience in similar situation in other countries it is inevitable that open dumping was causing contamination of surface and groundwater with observable impacts to residents living down the hydrological gradient from a dumpsite. A TRWMP contractor Meinhardt, undertook limited leachate sampling prior to the construction of interim landfills with interconnected leachate lagoons. Results from Pidie and Bireuen indicated the BOD, chemical oxygen demand and ammonia values were unexpectedly low compared to typical leachate composition for large landfills and similar sites in Thailand. The principal reason was probably due to considerable dilution of the leachate by rainfall entering the landfill although the mass load of contaminants entering the environment will still be high.

Improved impacts on the environment during the TRWMP

140. Several measures were introduced by the Project to reduce the potential environmental

impacts from the land disposal of wastes. The interim landfills were designed to have leachate retention lagoons with a design specification to removal between 50-70% of suspended solids, 25-40% of BOD and all human pathogens. This is to be achieved by retaining leachate for up to three weeks in a relatively sophisticated but low maintenance three-stage process involving aerobic decomposition, anaerobic decomposition and final effluent polishing in a reed bed wetland.

141. The design of the interim sites and sanitary landfills also included further measures to isolate wastes from adverse impacts on the environment. These measures were consistent with World Bank guidance and similar advice for landfills in middle income places. Wastes were isolated from the surrounding geology by a geotextile liner and also clay was available on some sites. The wastes were intended to be covered regularly and have perimeter drainage channels to reduce the infiltration of rainwater into the deposited waste. The operating procedures to compact and cover waste also serve to minimise the quantity of retained air in wastes. This is consistent with the aims to reduce the period of aerobic waste decomposition within the decaying waste (which creates high concentration leachate) before the onset of anaerobic decomposition (which creates lower concentration leachate).

Diversion of waste from land disposal

142. No substantive data was identified to indicate the effectiveness of the waste recycling activities to reduce the quantities of MSW going to landfill. One view expressed by the former head of the waste management department (DK3) in Kota Banda Aceh was that in urban areas perhaps as much as 50% of the MSW produced by residents was removed before it was collected to go to landfill. If correct, this is an impressive recovery rate for MSW with a high vegetable waste content. It is probably an over-estimate.

LESSONS LEARNT and RECOMMENDATIONS

143. The following issues are presented as the main lessons to be learnt from the implementation of the TRWMP and where further action by UNDP and others should be taken. Most of the points made are concerned with protecting the considerable investment made by the international community to assist Aceh and Nias Island and providing the best possible opportunity for the achievements made to be sustained into the future.

Lessons Learnt

First infrastructure development project

144. The TRWMP was understood to be the first major infrastructure project undertaken by UNDP in Indonesia. It deserves to be recognised as the largest and most extensive solid waste infrastructure project that has ever been directly managed and implemented by a UN body. This was a considerable achievement and should be viewed as a credit to the organisation and its collaborators. Consequently, UNDP should ensure the results and benefits recorded from this project are widely disseminated and used elsewhere in Indonesia and potentially beyond the country within the international system. It is suggested the UNDP should make a conscious effort to engage with the country offices of the principal international financing institutions and donor bodies to make them aware of the opportunities to improve solid waste management that have been demonstrated by the Project.

145. There is now a body of knowledge within or available to UNDP to run projects of a similar nature in the future. It would be a great pity if this is lost. There are also national waste management laws in place, which it is understood the Government of Indonesia is intending to bring into force in the near future. UNDP has the body of knowledge and local and national understanding to be in a position to assist the national government and perhaps also international partners to achieve their ambitions in improving this aspect of the national infrastructure. It is well within the capacity of the UNDP to replicate all or part of the TRWMP to other places in Indonesia. It is observed that perhaps a prominent place for a replication project would be in Jakarta. Also, the UNDP would be a natural partner to provide specialist assistance to an international financing institution at the pre-feasibility and disbursement monitoring stages of the life cycle of a waste infrastructure lending project.

Construction of landfills

146. The TRWMP has demonstrated it is possible to develop both intermediate and advanced landfill sites in Indonesia using largely local construction techniques, contractors and materials. Where there is determination within a local administration and access to sufficient funds then the landfill designs developed by the Project should be applicable to places elsewhere in Indonesia.

147. The interim landfills were effective in beginning the transition away from open dumping and introducing the concepts of the control of waste emplacement, water management and isolation of wastes from the surrounding geology. Separately, the demonstration of a manually-operated landfill site at Jantho was a textbook example of this low cost solution to waste management in more remote locations. It could be implemented in other places as a first step away from open dumping where waste quantities (say <10 tonnes per day) are low and there is no ready access to mechanical equipment.

150. The designs of the sanitary landfills are sound and considerable engineering effort has been made to ensure leachates are properly collected and treated. The design concepts employed at the four sites are likely to be transportable to other places.

Landfill operations

151. The weakest link in ensuring the success of the new landfills is sustaining a good standard of site operation. There is little doubt about the commitment and capability of the waste management department (DK3) for Kota Banda Aceh to operate waste disposal to a high, modern standard. This should also be achieved at the new Blang Bintang regional landfill providing the technical expertise from the Gampong Jawa site is fully transferred to the new Joint Secretariat.

152. Vigilance will be required to ensure the standards of operation at the other new sanitary landfills are maintained. This is by no means certain for the other sites and their performance in these early months since commencement of operations (at Pidie and Bireuen) and future commencement at Gunungsitoli) must be monitored rigorously. To this end UNDP should ensure it maintains a project monitoring capability in Aceh and Nias Island and is prepared to intervene with district administrations and national ministries if standards of operation require remedial action..

Political will

153. The success of any new waste management scheme where higher standards are expected relies on the continuing access to sufficient funds to finance the operations. Waste management is often a low priority topic in some districts and the endeavours by the Project to engage with local political leaders were mixed. In any future project involving waste management greater effort should be made to promote understanding and demonstrable support from political leaders to ensure the decisions, laws and budgeted funds are timely and adequate to sustain the improved waste services.

154. A disturbing dimension of public sector management in Indonesia is the regular rotation of middle and senior level managers and the situation where a new manager has no knowledge or inclination toward waste management. This situation has occurred on numerous occasions during the lifetime of the TRWMP and has a two-fold detrimental effect on achieving improvements. First, the previous trained and motivated manager is no longer in post and there is a loss of institutional knowledge. Second, the new person in post may not be able to maintain progress, requires time to be trained, time is lost in taking developments forward and may well adopt a different approach to that agreed with the previous person.

Model laws

155. The support given to districts to develop model qanuns to give waste management a legal basis and to define a local waste charging system were developed through the TRWMP for some districts. The model texts should be made available through the UNDP and national government web sites for other districts to utilise.

Waste management training modules

156. The eighteen waste management training modules developed with UN-HABITAT are a unique and valuable resource. This material is clearly applicable to other parts of Indonesia and the world. It would be disappointing if they were not widely communicated and made available on national government and UNDP web sites for others to download.

157. The modules also offer the opportunity to establish proper professional training and accreditation for waste managers. The route to achieving a step change in waste management within districts is to make the head of waste management a professional post and one that can only be occupied by someone with a certified qualification. UN-HABITAT tried for about one year to get the national certification body for Indonesia to accredit the training modules. This effort, with the collaboration of the Ministry of Public Works and the national certification body, should be continued.

158. After achieving national certification, UNDP should work with the Ministry of Public Works to adopt the modules for use in their two training centres. In addition, the modules could also be utilised by the provincial government training centres for administration (*Badan Diklat*).

Packaged designs and readiness criteria

159. The development of the packaged designs for sanitary landfills (accompanied by an environmental assessment and a waste management strategy) in the districts not in receipt of a constructed landfill are a practical and valuable innovation. A common basic landfilling concept has been adopted, an excavated disposal cell, and also a common leachate management approach. This has introduced a consistency in design that has the flexibility to be tailored to a local physical location. This packaged approach is suitable for use elsewhere, although the tailoring to other locations will still require specialist consultant input. A further development to explore is if the packaged designs can be applied to other places. The inclusion of design engineers would facilitate knowledge transfer.

More community engagement

160. The evaluation found that for most aspects of the work little attention was paid to encouraging active community participation in the decisions taken over waste services and new disposal facilities. Two exceptions were some community outreach made by the NGOs involved in the livelihoods from waste recycling component and the active discussion held with rural communities before and during land clearance activities.

161. The evaluation mission believes that future sustainability of the waste collection and landfill activities would have been enhanced if a greater emphasis had been placed on public education regarding the health and quality of life benefits from safer waste management. This would also have assisted district administrations in achieving an acceptable waste fee recovery rate from householders and influencing elected representatives to allocate sufficient budget to sustain improved waste services.

School garbage banks

162. These schemes were under-exploited in the TRWMP. They have the potential to reinforce positive attitudes towards waste recycling and better quality waste management; provide a creative learning opportunity for schools; disseminate waste education messages to the wider community through child-family interaction; and the cash earned from recycling can bring about visible improvements to the school environment. It was surprising only eight schemes were included in the livelihoods component. They are a low cost, high impact community engagement activity that should be replicable in many communities providing there is a receptive local administration and a local recycling enterprise through which the recovered waste can be sold. Replication through other UN bodies, such as UNICEF and UN Volunteers, should also be considered.

Livelihoods from wastes recycling

163. It was observed that most of the recycling livelihoods assisted by the Project were still in operation two years after the cessation of support. It is an encouragingly high proportion (c. 66%). The model adopted for established small operations and new start-ups was to provide assistance in three ways: the provision of small grants for equipment purchases and working capital; training in business skills; and the encouragement to adopt higher value added approaches such as higher payloads on trucks and the production of secondary products such as plastic bags and rope. The potential for replication of this approach, including collaboration with NGOs to help with local implementation, is high in those areas where there is access to a market for recycled materials

Gender promotion

164. This was not mainstreamed in the Project and activities where women (or other disadvantaged groups) benefitted from increase employment or status was fortuitous rather than managed. In any future project of this nature the project components should include more explicit reference to activities containing measures to improve female involvement in both decision-making and access to waste-related employment. There may well be cultural sensitivities to address too.

Project closure

165. There was no closure plan or exit strategy identified for the TRWMP describing of the phased run down of activities. Consequently, the impression found was that activities, personnel and project coherence have come to an abrupt halt in a largely unstructured way. The deadline for closing the MDF by the end of 2012 has precipitated this situation. Whilst the MDF closure date had been signalled some years earlier, the lengthy delay to construct the landfill construction work in Phase 3 inevitably brought the completion of the TRWMP into conflict with the deadline for project expenditure expected by the MDF. A project of the breadth and complexity of the TRWMP will inevitably have legacy issues to be managed, institutional knowledge to record and retain and products that should be assigned to others to promote for the future. No thought through strategy or list of actions was found and there is a risk that no one will have a comprehensive view on the completion requirements for the Project: even at this late stage, this should be remedied.

Asset transfer

166. It is not clear to the evaluation team if this is a significant problem or simply mired in uncertainty that can be resolved quickly. It is understood that Bappenas are concerned about the prompt transfer of assets from the TRWMP, namely the landfill facilities and transfer station and vehicle workshop at Gampong Jawa. There appears to be two interpretations of the Ministry of Finance rules on this matter. Senior level engagement is required to clarify this matter quickly and to avoid any residual responsibilities for the maintenance of the assets to be left with the UNDP if the transfer to the central and local government is delayed. This is a manifestation of not having a closure plan prepared during the final six months of the project, where issues of this nature could have been aired and hopefully resolved in good time.

167. It was explained to the evaluation team that the interplay of three factors have influenced the project closure arrangements: (a) the deadline for the closing of the MDF; (b) the delay in the implementation of landfill construction; and (c) the grey area of asset transfer regulation. Although district governments have said they were ready to accept the assets transferred to them at any time, the national government has taken the view that transfer could only be done once construction is fully completed.

Monitoring and reporting

168. The decision to have a monitoring and reporting person within the project team has been acknowledged by MDF as a beneficial decision. It meant the regular reporting and supply of data to the donors was relevant and informative. This approach should be adopted for future large waste-related projects.

Recommendations

169. It is the view of the evaluation mission the Development Objective, as revised, for the TRWMP has been met in full. To support this conclusion recommendations are presented largely as measures to take forward to safeguard the national and international investment into waste management improvements in Aceh and Nias Island. Each recommendation is noted for its relevance to either future post-disaster initiatives or general development assistance.

Development Assistance

Recommendation 1. UNDP should continue act as the catalyst and focal point with the Government of Indonesia on improving waste management and stand ready to implement on behalf of the international community (e.g. in collaboration with International Financing Institutions) programmes to replicate the achievements made in the TRWMP. For example, a similar project in Jakarta may be a timely development

Recommendation 2. UNDP should make provisions to see through to completion the construction and operation of the fourth sanitary landfill (Gunungsitoli).

Recommendation 3. There remains an active risk of regression in some districts whereby waste management practices could revert back to open dumping. The UNDP should agree with the Ministry of Public Works the measures to intervene in such locations. In addition, good working relations should be maintained with the waste management operations by the Joint Secretariat at Blang Bintang to seek their engagement as local mentors to assist those districts where regression is identified.

Recommendation 4. UNDP should continue to work with national ministries to achieve national certification for the waste management training modules, actively promote their use and disseminate them widely.

Recommendation 5. UNDP should continue its engagement with national ministries to clarify the method by which districts can present their landfill designs for consideration for funding under the forthcoming Accelerated Infrastructure Project. The design packages should also be offered to other districts as a starting point for the upgrading of landfill disposal in their areas.

Recommendation 6. The livelihoods from waste recycling, including the promotion of school garbage banks and utilising NGO support, are obviously replicable to other parts of Indonesia. UNDP is encouraged to seek opportunities to build these activities into its forthcoming programmes.

Recommendation 7. At national level there appears to be momentum behind the work of ministries to improve the funding available for waste infrastructure improvements. UNDP should seek to actively engage in dialogue with national bodies over the emerging ideas for a

possible 'donor infrastructure trust fund'; regionalisation of waste disposal with a separation of waste collection and disposal between district and provincial governments respectively; and the possible development of national technical standards for waste management.

Recommendation 8. UNDP should move promptly to resolve with the national government the apparent queries surrounding the transfer of assets at the end of the TRWMP.

Post-disaster initiatives

Recommendation 9. UNDP has built up a solid reputation and body of experience in the design and execution of debris removal and land clearance activities during a post-disaster recovery phase. This specialist knowledge should be maintained, and alongside the in-house waste management experience, should be managed in the future as part of UNDP's emergency response capabilities.

Recommendation 10. UNDP has also developed through the TRWMP an emergency response capability to re-establish waste collection operations by assisting public bodies in district administrations. This capability includes both the rapid implementation and management of large-scale cash for work programmes and the subsequent transition to a more sustainable waste fee-funded public service.

Recommendation 11. To complement its collection and clearance capabilities, UNDP now has unparalleled experience within the international community in Indonesia to design and construct interim landfills as part of a coordinated post-disaster recovery response. This capability should be made available to assist in future emergency response operations.

Annex 1: TERMS OF REFERENCE for the ASSESSMENT and EVALUATION

The main purpose of this evaluation is to conduct an independent assessment for UNDP, BAPPENAS, Ministry of Public Works, Local Governments of Aceh and Nias Island and key donors on the project's successes and failures, long-term results, the sustainability of project benefits, and synthesize lessons learned that inform future interventions. Knowledge and information obtained from the evaluation will be used as basis for better design and management for results of future UNDP activities in Aceh, Nias Island, and other areas in post-disaster recovery context in general. The evaluation also supports public accountability of the Government of Indonesia, UNDP, and the MDF.

The proposed evaluation will examine the progress, achievements, good practices, and lessons learned from the implementation of the waste management programme in order to give feedback to the project stakeholders.

The evaluation will provide a critical assessment of all three phases of the project, namely:

- Phase I: Initial project activities focused on providing a coordinated, pragmatic response to the public sanitation and environmental concerns associated with tsunami/earthquake debris, municipal solid waste management, and creation of livelihoods in waste management (2005-2007)
- Phase II: Transitional project activities focused on enhancing the local government capacity in coordinating the reconstruction process and promoting sustainable livelihoods through waste management mechanisms, in line with the Master Plan for Rehabilitation and Reconstruction of Aceh and Nias (2007 -2009)
- Phase III: The project's activities shifted from a focus on disaster recovery to restarting essential services for longer-term development of waste management infrastructure and services, capacity building of local government sanitation units, creation of sustainable livelihoods in waste management, and safeguarding the environment (2009-2012).

This final evaluation focuses on both the earlier achievements of the project in recovery, rehabilitation and reconstruction phases as well as its achievements in latter stages and their long-term sustainability. Aspects to be evaluated include: 1) the relevance of the project with respect to the priorities and needs of the district and provincial government, within the context of post-disaster recovery and longer-term development; 2) the technical performance of the project; 3) management performance; 4) achievements and results; and 5) synergy with other recovery and development projects and programmes.

The specific objectives of the evaluation are as follows:

1. To review and critically evaluate the achievement of results since the last Mid-term review as stated in the Project Documents;
2. To review each stage of the project in relation to the whole project, and in relation to the separate stages (post disaster early recovery, reconstruction, and long term development of sustainable environmentally focused solid waste management systems) and determine what has worked well and has not worked well;
3. To review and contextualize UNDP's TRWMP project efforts as part of the larger ERTR

- tsunami response effort and overall UNDP Country Programme;
4. To determine whether there have been any unexpected results in addition to the planned outputs specified in the Project Documents;
 5. To gain insights into the level of client satisfaction and expectation with the project. The clients include community and local government beneficiaries; national government partners and donors;
 6. To distil and document lessons learned from the TRWMP Project; including those pertaining to approaches, strategies, gender mainstreaming, management and partnerships, both in the context of country specific lessons and those relevant to other international post disaster programmes;
 7. To assess the effectiveness of capacity development for district level sanitation departments and the extent to which it contributed to overall improvement of sanitation departments' performance;
 8. To provide recommendations in light of the findings of the assessment to enable UNDP to sustain the benefits of the project and effectively respond to any future disasters both in Indonesia and globally within the solid waste and environment sector.

In doing so, the evaluation exercise shall use the standard OECD/DAC Evaluation Criteria for Evaluation of Development Assistance namely, Relevance, Effectiveness, Efficiency, Impact and Sustainability (For details see pages 168-170 of the Handbook on Planning, Monitoring and Evaluating for Development Results: <http://www.undp.org/evaluation/handbook>).

As a minimum the evaluation team is accountable for the following products:

- Evaluation inception report: An inception report should be prepared by the evaluators before going into the full-fledged data collection exercise. Based on the Terms of Reference, initial meetings with UNDP programme staff, the Planning, Monitoring and Evaluation Unit (PMEU), and desk review of relevant documents, the evaluators should develop the inception report. The report should include, at minimum, a detailed description of the evaluation purpose and scope, evaluation criteria and questions, methodology, sampling, evaluation matrix, and a revised work plan.
- Draft Evaluation report: The PMEU of UNDP-Indonesia and Project Board will review the draft evaluation report to ensure that the evaluation meets the required quality criteria. TRWMP will facilitate the review process by organizing a mini workshop for UNDP, Project Boards, and key partners in Banda Aceh, Medan or Jakarta to review the draft report and discuss the findings and provide inputs.
- Final evaluation report: The final report will reflect the results of the workshop and feedback from participants.

Annex 2: MISSION ITINERARY AND LIST OF PEOPLE INTERVIEWED

Date	Activity/ Respondents	Institution	Interview Location
28/11/12	Mr Sirman Purba (a), Deasy Ernawati (b)	(a) Monitoring and Evaluation Analyst , Planning Monitoring and Evaluation Unit, UNDP (b) TRWMP Project Associate, UNDP	UNDP offices, Menara Thamrin, 8th Floor, Jl. MH Thamrin, Jakarta
28/11/12	Mr. Nigel Landon (a), Mr Christian Usfinit (b)	(a) Formerly TRWMP Team Leader in Banda Aceh (b) Project Officer / Procurement Specialist for the TRWMP	UNDP offices, Jakarta
28/11/12	Mr Kristanto Sinandang	Head of CPRU, UNDP	UNDP offices, Jakarta
28/11/12	Lusina Walujati Satwiko	Governance Advisor, UN- Habitat	UN-HABITAT office, Menara Thamrin, 8th Floor, Jl. MH Thamrin, Jakarta
29/11/12	Mr. Faisal Ridwan (a), Aida Novita (b)	(a) Project Officer, Infrastructure Waste Management / Team Leader (b) Project Officer, Waste Management Livelihood, TRWMP, UNDP Banda Aceh	UNDP offices, 3rd Floor, Gedung Biro Organisasi Komplek, Kantor Gubernur Aceh, Jl. T. Nyak Arief No. 219, Banda Aceh
29/11/12	Mr. Jalal (a), Mr. Basrizal (b)	(a) Head, DK3, Banda Aceh (b) Head of TPA Section, DK3 Gampong Jawa landfill, Banda Aceh	Banda Aceh
29/12/12	Mr. Faisal Ridwan	TRWMP Team Leader, On- site meeting at new regional landfill site	Blang Bintang, Aceh Besar District
30/11/12	Mr Basyari Hassan, Mr Eddy Erwinsyah	Project Assistants, Land Clearance	UNDP, Banda Aceh
30/11/12	Community representatives and farmers	Kareung Ateuh Village, Indra Jaya Subdistrict, Land clearance site	Aceh Jaya District
30/11/12	Community representatives and farmers	Blang Baroh Village, Lhoong Subdistrict, Land clearance site	Aceh Besar District
30/11/12	Community	Lammanyang Village,	Aceh Besar District

	representatives and farmers	Peukan Bada Subdistrict, Land Clearance site	
01/12/12	Mr Teuku Iwan Kesuma	Former Head, DK3, Banda Aceh	Banda Aceh
03/12/12	Mr Syukurun Salman (a), Mr Syamsul Azhar (b), Mr Zainal Abidin (c)	(a) Member for District 3, Pidie Legislature, (b) Head, Dinas Kebersihan, (c) Head, Waste Management Department, Dinas Kebersihan	Pidie landfill
03/11/12	Mr Sulaiman	UD. Mandiri, General recycling	Blang Malu, Pidie
03/12/12	Drs Mhd. Yusuf	Head, Dinas Kebersihan	Bireuen landfill
03/11/12	Mr Husaini	General recycling, plastics granulation	Kura Blang, Bireuen
03/11/12	Mrs Eva	Delima Logam, General recycling, Juli, Bireuen	
04/12/12	Mr Said Mustafa	Head, Joint Secretariat (for Kota Banda Aceh and Aceh Besar)	Banda Aceh
04/12/12	Mr. Teuku M. Marco	TRWMP Project Assistant, UNDP Gunungsitoli	Gunungsitoli, Nias
05/11/12	Mr Albert Sinaga	Owner, Naga Saewe Plastic Industry, Plastics recycling, bag and rope production	Gunungsitoli
05/12/12	Mr Firman Harefa (a), Wirni Zebua (b)	(a) Secretary, Gunungsitoli Municipality (b) Head, Dinas Kebersihan	Gunungsitoli
05/11/12	Engineering construction contractors	Waskita Karya, On-site meeting at new site under construction	Teluk Belukar
05/11/12	Mr Abadi Zebua	Proprietor, Small-sale compost producer	Nias
06/11/12	Mr Dang Fumamlung, Mr Nyalmin Aceh, Mr Heron, Mr Bambong Bolam	Sanitation and solid waste personnel, Dinas Kebersihan	Gunungsitoli
07/12/12	Ms Dian Triastuti	Ministry of Public Works	Jakarta
07/12/12	Mr Handoko	Assistant Resident Representative - Operation	UNDP offices, Jakarta
18.02/13	CPRU team	CPRU	UNDP ofices, Jakarta
19/02/13	Ms Agustin Arryana	Deputy Director for Multilateral Funding	BAPPENAS offices, Gedung Madiun, 4th Floor, Jl. Taman Suropati No. 2, Jakarta

		Development, Bappenas	Pusat
19/02/13	Mr. R. Aryawan Soetiarso Poetro (a) Mr. Hermani Wahab (b)	(a) Director for Special Regions and Disadvantaged Areas, Bappenas (b) Head of KKR Aceh Nias Secretariat, Bappenas	Bappenas offices, Gedung Madiun, 4th Floor, Jl. Taman Suropati No. 2, Jakarta Pusat
19/02/13	Mr. Kemal Taruc	Programme Manager, UN-Habitat	UN-HABITAT office, Menara Thamrin, 8th Floor, Jl. MH Thamrin, Jakarta
20/02/13	Mr. Rudi Arifin (a) Mr Djoko Mursito (b)	(a) Designation Head of Sub Division PPLP, Directorate of Human Settlement, Ministry of Public Works (b) Director for Environmental Sanitation Dev, Directorate General of Human Settlement, Ministry of Public Works	Ministry of Public Works offices, Jakarta
21/02/13	Mr. Stephen Rodriques	Deputy Country Director	UNDP offices, Jakarta
22/02/13	Mr Safriza Sofyan (a) Ms Anita Kendrick (b)	(a) Deputy Manager, MDF for Aceh & Nias (b) Monitoring and Evaluation Officer	BEJ, Tower I, 9 th Fl, Jl. Jend Sudirman Kav. 52-53
22/02/13	Ms Wendy Shapiro	Programme Officer, UN Volunteers	UNDP offices, Jakarta

Other people with experience of the Project were also consulted by the evaluation team: Tim Walsh, Lesley Wright, Peter Seyler, Hester Smidt

Annex 3: LIST OF DOCUMENTS REVIEWED

- Austcare (2009) Final Evaluation IN15: Waste Management Livelihoods Programme in Aceh and Nias. Written by Martin Aspin, Evaluation Consultant, April 2009.
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<http://wml4aceh.wordpress.com/>

Annex 4: SITES VISITED

Illustrative photographs of the sites visited are presented in Annex 10

Component 1 – Land Clearance and Capacity Building

Agricultural land clearance at selected sites in Aceh Besar and Aceh Jaya

Kareung Ateuh, Indra Jaya subdistrict, Aceh Jaya

30th November 2012

Administratively, Kareung Ateuh is part of Indra Jaya subdistrict, Aceh Jaya district. It is situated 80 km from Banda Aceh. The rice fields cleared are owned by farmers from Kareung Ateuh and Meudang Ghon. The number of farmers benefitting from the land clearance in Kareung Ateuh is 95 persons and in Meudang Ghon, 60 persons. The total area of sawah cleared by the project is 150 ha with an average land ownership is 1 ha per farmer.

Land clearance started with the signing of a LoA between the TRWMP and DK3. After establishing the agreement, project staff conducted surveys on potential areas around the village. These were selected either voluntarily or on request from villagers or the local government. In Kareung Ateuh, the TRWMP staff went to the village several times to ensure that the land to be cleared was previously productive agricultural land. After confirming this, the project along with other relevant government agencies (Dinas for Agriculture, Bappeda) conducted education and community discussions on the work to be done. At the very beginning, project staff emphasized: (i) the project would only clear land whose owners promised to use it soon after the clearance ended; (ii) the project would only clear the land and no any other assistance should be expected; and (iii) in relation to point ii, the project would bring relevant Dinases for possible assistance from them. During socialization, Dinas for Agriculture joined and as a result, provided seed to be used by farmers.

The main constraints to the current rice production on the cleared land consist of: (i) lack of a hand tractor. At present villagers rely on tractors from outside the village with a rental rate of IDR 1,500,000 per ha. During peak period, the number of tractors is not enough; (ii) cattle sometime come into the sawah, as their sawah is unfenced, (iii) the irrigation system does not function properly; and (iv) no rice milling unit available in the village.

With the absence of rice milling unit, un-husked rice (*gabah*) was sold to traders who come and collect it. The price is IDR 4,200/kg. The traders took the *gabah* to milling units in other villages to be processed to become rice. Rice is then taken back to the village to be sold. The current price is IDR 8,500 per kg. In effect, farmers buy rice that is processed from their own *gabah*.

According to the farmers, the land clearance has enabled them to cultivate successfully again their sawah. From this the benefits include more production, higher income and more food secure. Another thing is that cultivation of sawah has reduced the pressure on the forest.

Regarding the changes observed in the village after the land clearance, villagers confirmed that (i) before land was cleared, more people were seen sitting and chatting in the coffee shop or around the village, but such scene is no longer seen after the availability of sawah, (ii) Until now, they have

used their sawah for rice production three times since the land clearance. The productivity is about 1.7 t/ha (equivalent to an annual income for unhusked rice of IDR 23.8 million/ha). Farmers acknowledged that this productivity is roughly the same as before tsunami. However, using the seed that mostly come from government assistance, they are now able to plant and harvest rice twice a year and sometimes three times if water is available due to intensive rainfall. In the period before tsunami they used to plant conventional varieties that could be harvested only after 6-8 months. The collective support of the TRWMP and Dinas Agriculture has approximately doubled the annual income of farmers compared to before the tsunami.

For the land clearance, the project used two contractors. The first contractor was terminated by the project because he did not work as specified in the contract. The project then hired another contractor to replace the first contractor. Land clearance took place from June 2011 – Nov 2012. The farmers whose sawah were cleared at the beginning, now have had three seasons of rice harvest.

Blang Baroh village, Lhoong subdistrict, Aceh Besar District

30th November 2012

Land clearance was done by a contractor hired by the project. Once again, the first contractor did not complete the clearance. According to the farmers, the contractor just put the pile of debris in farmers' rice fields. Some months later a representative of the villagers contacted the project, asking for the recommencement of the clearance. The project hired another contractor to complete the land clearance. The total sawah cleared was 23 ha, consisting of 6 ha by the first contractor and 17 ha by the second contractor.

The project used the same approach in initiating the clearance as for Kareung Ateuh village. The project only cleared the land and helped the community ask the relevant Dinas to assist farmers. Dinas for Agriculture assisted with seeds, but the amount was reportedly not sufficient. So some farmers reportedly used their own seed. Farmers in the village have been able to have had several rice harvests since the clearance of their sawah. Their sawah could be planted rice twice a year, and also peanut cultivation is possible during the period between the two rice planting seasons. Most farmers sold their gabah soon after the harvest. The price of un-husked rice is IDR 4,300 per kg, and milled rice is from IDR 7,800 to 8,800 per kg.

As many as 86 farmers have benefitted from the land clearance. The clearance has enabled farmers to cultivate their sawah, which is the main source of income for most farmers. The cultivation of sawah increased their income and improved their food security status compared to the situation before the tsunami. A project was facilitated by the relevant Dinas to help farmers with the construction of a 500 metre main irrigation channel.

Munasah Masjid village, Leupueng subdistrict, Aceh Besar district.

30th November 2012

The land cleared is situated in two spots with the total area of 37 ha. Land clearance activities were started in the 1st week of March in 2011. Following the clearance, the land was used only once for planting rice. After this villagers returned to their previous jobs, including suspected illegal logging, and have now completely abandoned the cleared land. Two major reasons behind the challenge are that farmers have alternative incomes that provide a more lucrative income and do not yet see the need to return to their fields. Alternative income here is illegal logging. In such cases, if the cleared lands are abandoned, they will not be productive. Therefore, getting the commitment of

the farmers to cultivate their cleared lands is important to restore the productivity of the lands, which will in turn contribute to the improved livelihoods.

Strong government commitment is also needed. This is essential to success of the farmers in renewing their livelihoods as the government can support the community with essential infrastructure and inputs, such as irrigation systems. There are many complicated challenges with reclaiming tsunami-impacted land, and district agencies working on water resources or agricultural issues can offer technical assistance to rebuild the community. The failure in livelihood restoration on cleared land may also be related to the assessment. Project staff mentioned the assessment in this village might not have been as detailed or strict as that in Lhoong and Kareung Ateuh. The assessment failed to reveal the insufficient motivation amongst the villagers to return to the fields once the clearance activities were completed.

Lammanyang Village, Peukan Bada Subdistrict, Aceh Besar

30th November 2012

The project cleared 181 ha of sawah distributed in 7 villages, one of which is Lammanyang village. The other six villages are Keu Neeu, Beuraden, Lamteh, Lam Awei, Meunasah Tuha, and Lam Isek. Sawah in four villages had been cleared by BRR. But the sediment was not cleared effectively so their sawah still could not be used for rice cultivation. Farmers then contacted TRWMP to further clear the land. The land cleared completed in June 2012 and was recently planted with rice for the first time.

Farmers noted that in spite the closer distance of their villages to Banda Aceh, it is the fact that they could not use their sawah for many years since the tsunami. In some years following the tsunami, villagers did not lobby to clear their sawah, as they could find paid work in the many reconstruction and rehabilitation activities in Banda Aceh and the surrounding area. Now, construction work is less available and with the general rise in rice prices the villagers sought to return to rice growing. Consequently, they expressed satisfaction with the TRWMP project and 60 farmers in Lammanyang Village can now use their sawah for rice cultivation.

Component 2 – Dumpsite rehabilitation and sanitary landfills

Gampong Jawa, Banda Aceh

29th December 2012

This site is close to the city of Banda Aceh and used as the city dumpsite for many years. It is in an exposed location on the seaward side of the city and as part of the TRWMP the long term solution to SWM for the city has been the development of a new landfill inland. It was recognised a new site, to be at Blang Bintang, would take some time to approve and develop. Negotiations and joint working arrangements with the adjacent Aceh Besar district and the allocation of central government funds also had to be agreed. Consequently, the TRWMP worked with the *Dinas Kebersihan dan Pertamanan* (DKP) and city Secretariat to convert the Gampong Jawa dumpsite into an engineered operation and to finance an interim extension providing a further 3 to 4 years life. In 2008 the mid-term assessment mission visited the construction works for the extension and made a number of observations on the design and space available for future waste transfer operations to Blang Bintang. Subsequently, work progressed and the extension received its first waste in 2009. From the observations made and discussions with DKP personnel it is clear the site has been operated as a model engineered and controlled operation. In 2012 the mission found the extension was almost full and were impressed with the achievements of DKP in maintaining good site operational standards.

It was found the combination of a willing and municipal committed waste department, city leadership, external design assistance (Meinhardt) and capacity building through training (TRWMP staff and the UN-HABITAT programme) had resulted in an impressive improvement in waste management. The trained staff could clearly express the principles of controlled waste handling and placement and the site appeared disciplined and well maintained. The operation had sufficient mechanised equipment and the TRWMP supplied maintenance workshop to provide a continued level of operation. Financial resources allocated from the city also appeared secure. DKP seemed genuinely pleased they were recognised nationally as a model operation and their new landfill at Blang Bintang was a state of the art facility in Indonesia. The DKP were waiting for the final details of the new management and staffing arrangements at the new UPTD organisation created to operate the new regional landfill and were preparing to move operations to Blang Bintang and the new organisation. A new 'over the top' waste transfer station had been constructed near to the entrance of the Gampong Jawa landfill and it was waiting for containers and bulk haulage trucks to be supplied for transfer operations to begin immediately after Blang Bintang landfill becomes available for use.

Blang Bintang

29th December 2012

The new landfill is a major undertaking and represents the most advanced landfill constructed by the TRWMP and is probably the most modern in Indonesia. It conforms to the four aspects of sanitary landfill design: 1. Full geological isolation of wastes from the surrounding strata by the installation of a geotextile impermeable membrane; 2. Constructed using detailed professional engineering designs provided through the TRWMP; 3. Trained staff familiar with good waste management will work at the site and leachate for the waste will be treated in a full three-stage treatment process (anaerobic, aerobic and reed bed polishing); and 4. A waste tipping plan has been prepared and specialist waste handling equipment will be used to compact and cover waste shortly after its delivery to the site. At the time of the site visit the landfill site construction was nearing completion. The waste disposal cell was complete and work was underway on completing site office and workshop buildings. A waste trans-shipment platform was completed and ready to use to transfer waste from road vehicles to site haulage vehicles. Final preparations and leak testing were underway in the anaerobic and aerobic chambers of the leachate treatment system and most of the twelve zone reed bed final treatment stage had been planted out.

The prevailing concern with the future operation at this landfill is the selection of staff for the new Joint Secretariat. DK3 are operating the existing landfill at Gampong Jawa in a satisfactory manner and the UNDP should make representations to ensure the new management structure is led by a trained and experienced waste manager. Experienced DK3 personnel should also be in leading roles to manage the operational work at the new landfill. The mission heard disturbing comments whilst in Banda Aceh that the senior leadership position may not be awarded on technical merit and competencies to operate a successful waste landfill. The UNDP should liaise closely with the district and regional authorities and Department of Public Works to satisfy itself the staffing and structure of the Joint Secretariat will be appropriate to the achievement of a successful regional landfill.

Km 23, Pidie

3rd December 2012

A substantial transformation of the Pidie landfill has taken place since the last assessment at the end of 2008. Dump conversion improvements in the original tipping area were put in place during

Phase 2 of the TRWMP. This part of the site has been completed and the Project has also completed the next stage of development, the construction of three lined waste disposal cells stretching down the side of a hill. The first cell is large, 15m deep at the top and 8m at the lower end. Leachate from the closed, capped dump site drains into a new three-stage leachate treatment system (aerobic, anaerobic, reed bed polishing). Leachate from the three new disposal cells will, once they begin to receive waste, also be treated through the new treatment system. The site receives eight collection 5m³ trucks per day, with an estimated total daily input of ~15t/day (assuming an in-truck waste density of 0.4t/m³).

The landfill has been operated for only two weeks. Two staff were working at the site and the Dinas stated it will rise to four in the future. Waste deposition in the first cell was messy with obvious uncontrolled tipping from the top of the cell rather than vehicles entering the cell via a ramp and depositing waste at the base of the site. Waste had been cascaded down the left hand side of the cell from the site access road. Mechanical plant was seen in operation and a mechanical shovel comes to the site only once a week to compact waste and an excavator for stockpiling waste cover material only once a month. It would appear the intention is to compact waste once each week and to cover the waste with soil on a monthly basis. The Head of the Dinas apologised for the poor deposition of waste. They explained the heavy rain recently had affected access into the cell and promised to rectify the situation. A borrow area for soil cover is located at the top of the hill but may not be sufficient for the lifetime of the site. The access road to the site is heavily rutted.

The Dinas seemed clear on the actions that had to be taken. The UNDP should monitor the site on a weekly basis to ensure the corrective action it put in place without delay.

Bireuen

3rd December 2012

The construction of the new site as a Phase 3 activity was completed in October 2012 and waste emplacement began in November. The new site has two cells, a small first cell (with a capacity of less than two years) is located near to the site entrance and a much larger cell (around 5 years life) further into the site. The completed interim controlled dumpsite has been completed and capped. Leachate from the completed site and the two new cells is passed to a new three-stage leachate treatment plant (aerobic, anaerobic, reed bed polishing). The site receives around 14, 5m³ trucks per day representing ~70m³/day. Daily waste intake is around 28t per day, assuming an in-truck waste density of 0.4t/m³.

The new landfill at Bireuen was opened approximately one month ago. The small cell has been receiving waste for over four weeks and none of this has been controlled in its placement or compacted by mechanical plant. In effect, it has started its life with uncontrolled disposal within and around the engineered cell. The indiscriminate disposal has blocked vehicle access to the small cell and collection vehicles are now moving into the site to deposit waste in an uncontrolled manner from the top of the second cell. Animals were also seen wandering over the waste. The site will rapidly revert to an open dumping environment unless swift intervention is made to bring mechanical plant to the site and operating it to restore control of the disposal operation. The Dinas reported they have three pieces of mechanical plant at a depot in town but no budget to bring the plant to the landfill or operate it. In this respect, the district does not appear to be honouring its side of the agreement with the UNDP. It is suggested the UNDP Project Assistant based in Bireuen needs to intervene immediately with the Dinas and district administration to get the mechanical plant to the site and to ensure it is operated in a manner to restore good waste disposal.

Teluk Belukar, Gunungsitoli, Nias Island

5th December 2012

The initial intention was for the site to be constructed from 2009. Following a pre-feasibility review of 17 locations, the Teluk Belukar site was selected and protracted administrative issues related to changes in the status of the municipality of Gunungsitoli delayed decision-making, social concerns were expressed by two adjacent communities and the first 3.5ha of land required for the site was not purchased until August 2011. A further 7ha was only purchased in April 2012. During 2012 the TRWMP team had to conduct three procurement exercises between May and October 2012 to secure a competent construction company prepared to undertake the work at an acceptable contract sum (US\$ 1.2million). In July and September 2012 the project team attempted to develop a joint venture with local contractors. This proved unsuccessful and eventually the contractor undertaking the construction of the Blang Bintang regional landfill agreed to undertake construction. The bid submission, evaluation and approval procedure within UNDP for the appointment of the contractor took only a month to complete.

The construction of this modern landfill as a Phase 3 activity has started late in the timescale of the Project following considerable delays in achieving agreement and purchase of land. Thirteen hectares of land for the new site was finally purchased in April 2012. The plan is to build a modern new landfill with capacity of 5 to 7 years. Construction commenced in November 2012 and an optimistic completion date is February 2013. During the site visit there were no constructed facilities. Site engineers were conducting soil tests and marking out the planned two wastes cells on the site and the three-stage leachate treatment plant.

Site access from the highway is along a single track road and would benefit from widening. This would not be part of the TRWMP investment.

Concerns were expressed by the Dinas they are not trained or prepared with sufficient site equipment to operate the new landfill.

Component 3 – Livelihoods from recycling

Sulaiman Yacob (Ud. Mandiri)

3rd December 2012

(Based on interviews during a field visit and a Mission Report by Nicholas Brooks (WML Advisor))

Before starting in the waste recycling business, Sulaiman Yacob (35) was a truck driver between Takengon and Medan, transporting vegetables such as carrots, tomatoes and chillies. He learnt about the recyclable goods business from his brother (also a scavenger) and after seeing the potential of other scavengers. His brother also introduced him to his boss: a bigger waste collector in Meureudu.

Sulaiman Yacob started work as a scavenger in Meureudu in 2003. Initially his becak and business capital was provided by the local waste collector, and for that reason, Sulaiman was obliged to sell his recycled goods to that collector. At this time, Sulaiman bought recyclable goods with IDR 150,000 and sold them for IDR 250,000 (average value, depending on the type of waste): he also bartered for extra recyclable goods with basic plastic goods. Business grew as he received funding for a small warehouse and IDR 3,000,000 loan capital from the bigger collector, which he was able to repay in only one year.

In 2007, Sulaiman received assistance from UNDP through YCAP for 1 becak, 2 scales and IDR 4,000,000 business capital. He also received training included sharing knowledge on recycling and

financial management by YCAP. With this assistance, Sulaiman was able to become more independent and stop being effectively 'tied' to the single larger collector for capital and sales.

Sulaiman's business model was to increase his own pool of becaks and scavengers. Armed with the assistance from UNDP, Sulaiman initially bought (on credit) one second hand becak. He continued to buy further second hand becaks until in less than two years he had 11 becaks (by the end of 2008). He has strong spirit to develop his business and very grateful he also got support from his former boss. Sulaiman said: "when I planned to have a bigger warehouse and sell the goods directly to Medan, I discussed it with my former boss. I believe my boss will support me instead of considering me as his competitor". To attain his plan, he borrowed capital from the larger collector for IDR 70,000,000 as the initial capital to open bigger warehouse. With persistence and a clear business model, he was able to repay this loan within a year. At the same time he also set aside some profits for becak driver's credit. By 2009, he had 20 becaks and 3 pickups. Over the years Sulaiman has overcome many business challenges including the Global Economic Crisis that impacted many waste collectors in Indonesia. He claims that this is due to the personal connection he has to a single "agent" in Medan, who arranges the best prices with recycling factories. Through this connection he got early warning of impending drop in prices of recycled goods (3 days before others) and this helped him to avoid significant impact.

Afterwards, when TDH-I implemented WML Round 3, Sulaiman was shortlisted to receive further assistance. TDH-I visited Sulaiman on a number of occasions before asking him to submit a proposal for requested grant items. Through WML Round 3, Sulaiman received an additional warehouse, scales, pressing machine and 2 becaks. In addition his workers participated in the training on plastic waste. According to him, the training is beneficial in which his workers can have more understanding about the various types of plastics, which is useful especially in sorting the plastics. Overall, he acknowledged the UNDP assistance supported his business to be successful.

Currently, Sulaiman has 26 becaks and 4 pickups and employs 26 workers consisting of 3 permanent and 23 daily wage workers (scavengers). He sends recovered wastes 4 times/month on average with 20 t/truck/trip and a value of IDR 125 million per trip. This implies an average profit margin of 10 percent. With his current business volume of IDR 500 million per month this represents a monthly profit of IDR 50 million. If deducted with the salaries for his permanent workers, he still earns just over IDR 40 million per month.

He says "when the first time I switched to this business in 2003, I never thought it could grow up as nowadays. I really thank the UNDP for its two rounds of assistance through YCAP and TDH-I. Both helped me expand this business. I wish I could repay the bank loan on time and move to my own land". Sulaiman had a wife and 5 children, 3 of them have been sent to school and 2 other are toddlers". In 2010 he received from TDH-I a further pressing machine, 2 becaks, and 1 building. The presence of pressing machine saves volume in his trucks. Previously he could only ship 7 tonnes in one shipment to Medan, now he can ship 18-20 tonnes.

He has now had more developments in mind. Now has bought land, opened a one mechanical workshop and expanded to three branches. One branch is in Meulaboh, another in Tangse and the third will be opened soon in the area where he operates now. He will open the business on land he has bought recently using credit from BRI (IDR 150 million). He shared his strategies for his business:

- To maintain and take care of his equipment, so their economic lifetime can be maintained

for a long time. All assistance and support from UNDP in the form of physical assets are still operating well and in good condition

- To maintain good relationship with workers, not only based on monetary terms only but also on social and personal matters
- To maintain good relationship with the surrounding community. Pak Suleman always tries to employ local people, especially those unemployed.
- To use profits for purchasing capital goods or adding investment, not used to buy commercial goods. He has used the profit to buy more becaks, invest in land, build a mechanical workshop and expand to other areas.

Pak Husaini

Desa Tingkeum Manyang Kecamatan Kurablang Kab, Bireuen

3rd December 2012

(Based on interviews during the field visit)

Pak Husaini received assistance from TDH-I in 2010. He received 1 becak, 1 building and 1 pressing machine. In addition, his workers participated in the training on plastic waste. He acknowledged that the assistance supported his business very much to be successful and develop into its present condition. He operates in two locations. One location is the collection point of recyclables, and another is for the shredding machine. With this machine he becomes a buyer for plastics from smaller waste plastics collectors in his area, such as Ibu Eva. He developed a collaborative relationship with them. His workers are able to explain about the types of plastics and the way of sorting them to the workers at smaller collectors, who acted as his supplier for his grinding machine.

He can ship 10 times in a month to Medan. Each shipment has a value of about IDR 80 million. The volume is an average 12 tonnes, with a total business volume of IDR 800 million a month.

The business now has 25 workers consisting of permanent workers and temporary workers. They are given daily salary but calculated monthly. The only challenges of this business is the price fluctuation of recycled materials. It occurred in 2008 during the global crisis when the price of recyclables was very low.

He shared his strategies of success: (i) control the business consistently; (ii) make the workers manage themselves and each other; and (iii) create collaborative relationship.

Ibu Eva

Delima Logam, Jl Gayo Km 1.6 No. 2 Juli Stuy, Kecamatan Juli Kab, Bireuen

3rd December 2012

(Based on interviews during the field visit)

Mrs Ibu Eva received assistance from UNDP through TDH-I: 2 becaks and a pressing machine. TDH-I also gave them training on the use of machine. Her workers did not get training on plastic materials but they were given knowledge and skills about plastic materials by Mr Husaini's workers, who attended the training. According to Mrs Eva, in providing the machines to beneficiaries, TDH-I used local suppliers. So the quality of the machines provided is varied. She is able to send recycled materials to Medan once every two weeks, the volume of which is 18-20 t with the value of about IDR 100 million. For recyclables from plastic materials, she sold them to Pak Husaini who has shredding machine. She could sell 3 tons of plastic materials in a week with the value of IDR 11 million.

Based on her experience, the most profitable waste material is iron and steel, with the profit margin reaching 25%. However, the price of iron is reduced because of the emergence of a supply of iron from India with lower price. In general, price is controlled by wholesalers in Medan. Wholesalers are companies that process and prepare industrial tonnages of recyclables for sale on domestic and international markets. When materials are scarce, buyers from Medan sometimes come to Aceh to buy metal materials directly from mechanical workshops and similar places in Aceh.

She employs 3 workers in the warehouse and 4 workers for sorting the collected recyclables. She also has connections with about 30 scavengers. These scavengers are free to search for materials in any place they want. She has a plan to buy car when her money is sufficient. Now she has 8 becahs. She started the business in 2003 operating from part of another person's warehouse. She had 2 million as initial capital from her husband. In addition to scavengers, she gets recyclables from workers in the truck owned by Dinas Kebersihan. They sell recyclables to her every morning.

Albert Sinaga

Naga Saewe Plastic Industry, Gunungsitoli, Nias Island

5th December 2013

The enterprise has been operational in Nias for many years. It produces plastic bags and rope. Plastic wastes are brought by scavengers from all over Nias. Plastic wastes are processed again and become the raw materials for making bags and rope. Most products are marketed locally, but some are sold to Medan. At present, Naga Saewe employs 45 workers, consisting of 15 permanent workers and 30 temporary workers. This is a good improvement from 25 workers it had in 2008.

Naga Saewe received assistance from Austcare/UNDP through PINBIS. His proposal was for two polybag plastic making machinery and parts and operational budget (IDR 6.5million), however only received 2/3 of the machinery cost from PINBIS, so had to buy lower specification machine and modified for standard plastic bags. Currently it produces 25 tonnes per month.

Naga Saewe is the only plastic producer in Nias, and until 2011 all production could easily be absorbed by the local market. However, since 2012 the competition has become tougher with plastic bags produced in Medan. This is because Naga Saewe still uses the raw materials obtained from processing various types of plastics, while those in Medan now use raw materials from similar plastic bags. Processing similar plastic bags as raw materials requires a lower cost, enabling the producer to reduce the price of final products. To overcome this issue, Naga Saewe plans to establish collaboration with TPA. It has strong expectation with the building of the landfill in Gunungsitoli. This way the workers or scavengers would be able to collect plastic bags to be used further as raw materials.

Comments on the project are that there was a lack of monitoring by Austcare and UNDP of the PINBIS activities, whose grant support was either inadequate or not effectively targeted for this SME.

Annex 5: EVALUATION QUESTIONS

The following are questions developed based on the ToR and in accordance with UNDP evaluation guidelines.

Relevance: the extent to which intended outputs and outcomes of the Programme are consistent with national and local policies and priorities and the needs of intended target groups, direct and indirect beneficiaries.

- Are TRWMP project overall objectives consistent with, and supportive of, Partner Government (GoI, provincial and district/municipality governments in Aceh) policies and priorities?
- Does the TRWMP project respond to the needs of the key partners?
- Are TRWMP project objectives and results clear and logical, and do they address clearly identified needs?
- Are project objectives and targets in line with the SMART (Specific, Measurable, Achievable, Realistic and Time-bound) principle?
- Is the design of the TRWMP supported sufficiently by all stakeholders and have stakeholders been involved in the design process?
- Are coordination, management and financing arrangements clearly defined and do they support institutional strengthening and local ownership?
- Are the objectives clearly understood by TRWMP partners?

Appropriateness: the cultural acceptance as well as feasibility of the activities of methods of delivery.

- Are the activities and outputs planned appropriately to achieve the project outcomes?
- Was TRWMP project appropriate with the local context?
- Have the relevant cross-cutting issues (environment, gender, human rights and governance, donor coordination or others) been adequately mainstreamed into TRWMP project design?
- Were the final delivered activities in line with feasibility studies conducted during the Programme?

Effectiveness: evaluate project effectiveness and to what extent has the project produced its desired objectives and outcomes. In particular, for the main components of the Programme the following will be considered: 1) The change, where data is available, in the observed output or outcome; 2) Attributing observed changes or progress towards changes and determining the UNDP contributions towards the observed changes; and 3) Estimating the quantitative or qualitative value of the change (whether positive or negative).

- To what extent has the TRWMP Project achieved its intended outputs?
- To what extent those achievements can be attributed to the TRWMP project implementation?
- What is the quality of the results/services available?
- Are there any factors which prevent target groups accessing the results/services?

- To what extent has the TRWMP project adapted or is able to adapt to changing external conditions (risks and assumptions) in order to ensure benefits for the target groups?
- Are the risks and assumptions holding true? Are risk management arrangements in place?
- To what extent are unplanned positive effects contributing to results produced/ services provided?

Efficiency: how economically resources or inputs (such as funds, expertise and time) were converted to results.

- How well are inputs/resources being managed?
- To what degree are inputs provided/available on time to implement activities from all parties involved?
- To what degree are inputs provided/available at planned cost (or lower than planned), from all parties involved?
- Are project resources managed in a transparent and accountable manner?
- Are all contractual procedures clearly understood and do they facilitate the implementation of the TRWMP project?
- How well is the implementation of activities managed?
- Is an activity schedule (or work plan) and resource schedule available and used by the project management and other relevant parties?
- To what extent are activities implemented as scheduled? If there are delays how can they be rectified?
- Are funds committed and spent in line with the implementation timescale? If not, why?
- How well are the activities monitored by the project and are corrective measures taken if required?
- If appropriate, how flexible is the project in adapting to changing needs?
- If appropriate how does the project co-ordinate with other similar interventions to encourage synergy and avoid overlaps?
- How well are outputs achieved?
- Are the outputs achieved likely to contribute to the intended results?
- Do the inter-institutional structures e.g. steering committees, technical team meeting and monitoring systems, allow efficient project implementation?
- Have all/some partners been able to provide their financial and/or other contributions?

Sustainability: the extent to which benefits of the Programme will continue after external development assistance has withdrawn.

- Is sustainability an integral part of the design i.e. is there a phase out/hand over strategy?
- Is the sustainability strategy fully understood by the partners?
- If the services/results have to be supported institutionally after conclusion of the project, are funds likely to be made available? If so, by whom?
- Are the services/results affordable for the key partners at the completion of project?
- What is the level of ownership of the project by key partners and will it continue after the end of external support?
- How far the project is embedded in local structures?
- To what extent are relevant key partners actively involved in decision-making concerning project orientation and implementation?
- What is the likelihood that key partners will continue to make use of relevant results?

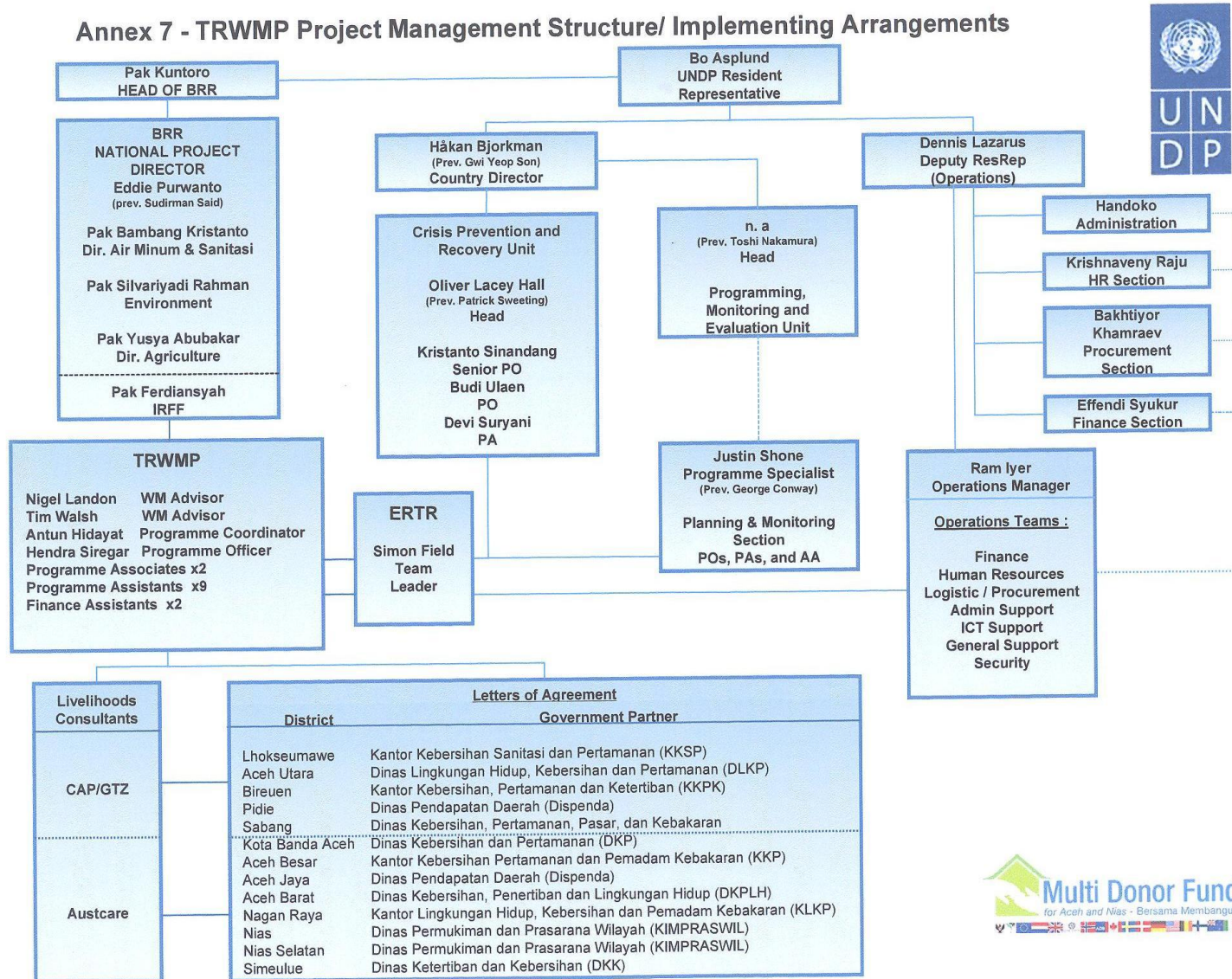
- Do the key partners have any plans to continue delivering the stream of benefits and if so, are they likely to materialise?
- What is the level of policy support provided and the degree of interaction between project and policy level?
- What support has been provided from the relevant national, sectoral and budgetary policies?
- Are the material, services and equipment support likely to continue after the project has finished?
- How well is the project contributing to institutional and management capacity?
- What lessons can be drawn from the coordination efforts and working arrangements between the project team, its counterparts/ beneficiaries, Bappenas and partners organizations/ other providers of similar type?

Impact: changes in human development and people's wellbeing that are brought about by development initiatives, directly or indirectly, intended or unintended.

- What are the direct impact prospects of the project at overall objective level?
- What, if any, impacts that are already apparent?
- What impacts appear likely?
- Are any external factors likely to jeopardize the project's direct impact?
- To what extent does/will the project have any indirect positive and/or negative impacts? (i.e. social, cultural, gender and economic)
- Have there been/will there be any unplanned positive impacts on the planned key partners or other non-targeted communities arising from the project? How did this affect the impact?
- Did the project take timely measures for mitigating the unplanned negative impacts? What was the result?

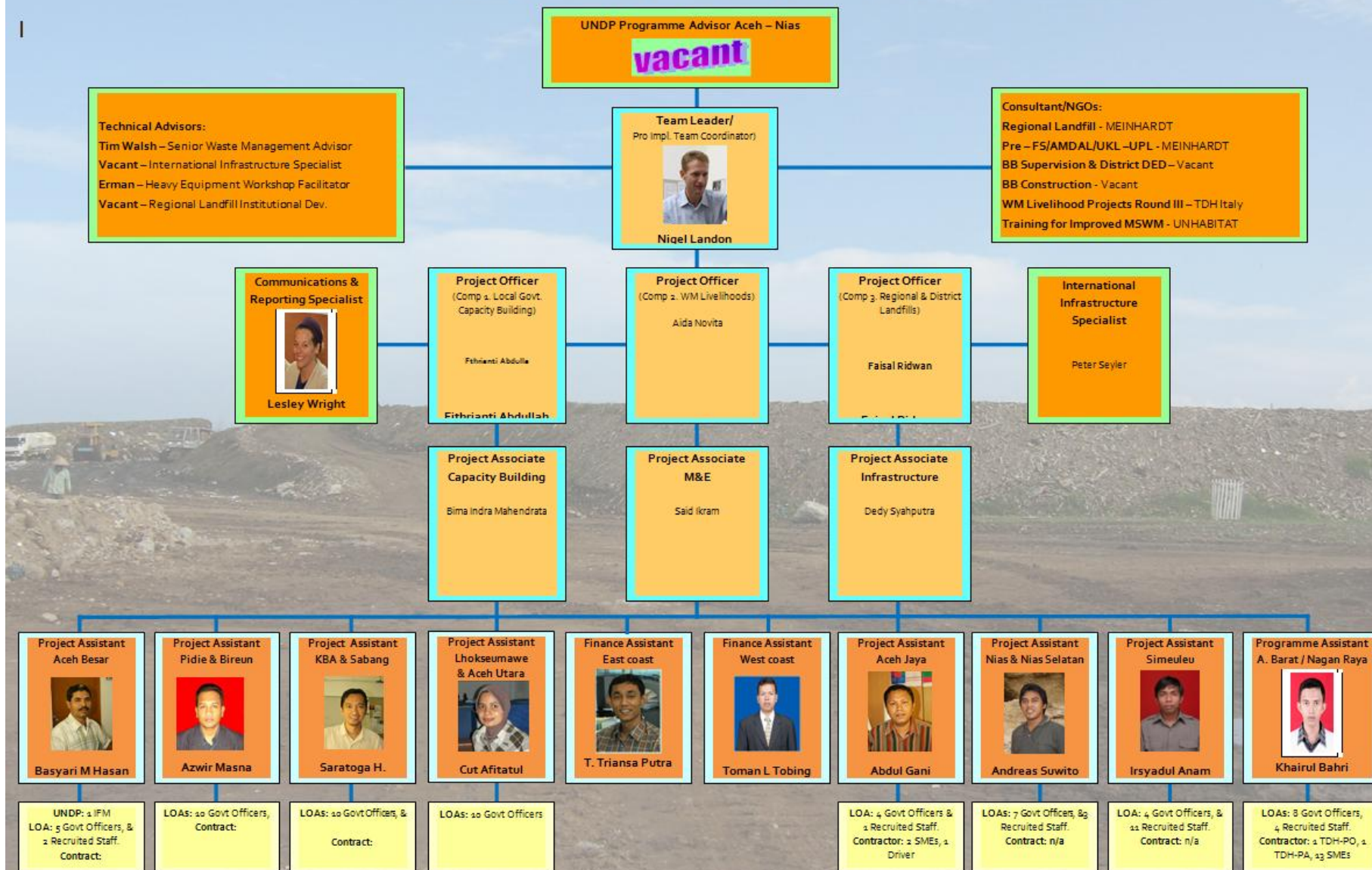
Annex 6: PROJECT LINE MANAGEMENT RESPONSIBILITIES in PHASE 1

Annex 7 - TRWMP Project Management Structure/ Implementing Arrangements

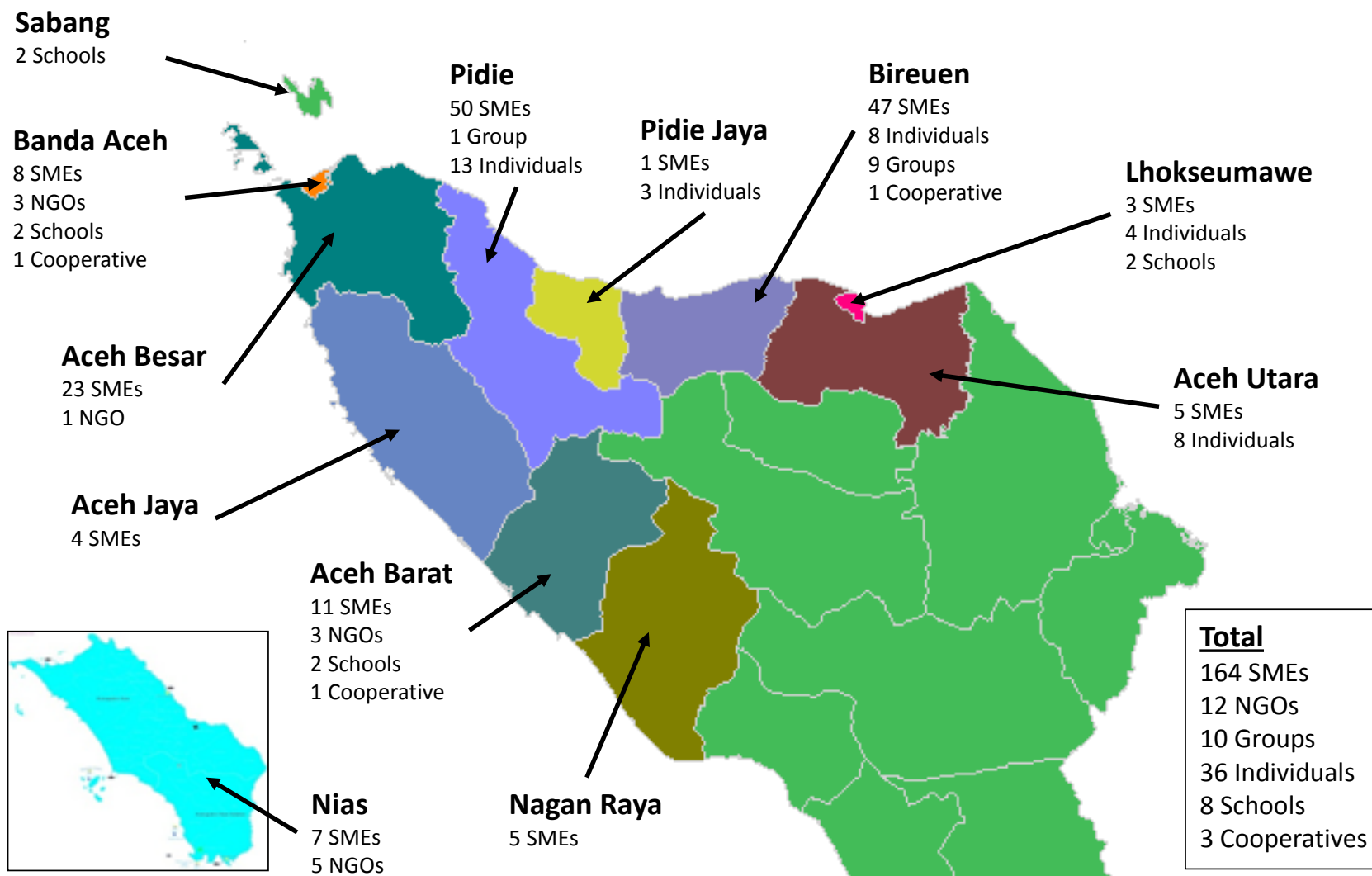


Annex 7: Team Organogram: TSUNAMI RECOVERY WASTE MANAGEMENT PROGRAMME (TRWMP)

TSUNAMI RECOVERY WASTE MANAGEMENT PROGRAMME (TRWMP) STAFF ORGANIGRAMME – OCTOBER 2011



Annex 8: DISTRIBUTION of BENEFICIARIES from the WASTE LIVELIHOODS COMPONENT



Annex 9: SUMMARY of the LANDFILL DEVELOPMENTS UNDERTAKEN by the PROJECT

District	Location Name	New Location (Y/N)	New Interim landfill	Upgraded from dumpsite to interim engineered landfill	Construction of permanent engineered landfills	Financial support for operations/maintenance (Y/N)	Closed* Still in use
Simeulue	Suak Buluh	N	N	Y	N	Y	0Y
1							
2 Aceh Utara	Alue Lim 1	N	N	Y	N	Y	1Y
3 Lhoksueumawe	Alue Lim 2	N	N	Y	N	Y	1Y
4 Bireuen	Cot Bukeet	N	N	Y (before new landfill built)	Y	Y	1Y
5 Pidie	Benteng Beach	N	N	N (dumpsite closed and waste removed to km23)	N	N	0N
	Mutiara	N	N	N	N	Y	1N
6 Aceh Besar	Cot Padang Lila Km. 23	N	N	Y (before new landfill built)	Y	Y	1Y
	Jantho	Y	Y ('manual landfill')	N	N	Y	0Y
	Blang Bintang (also serves Banda Aceh)	Y	N	N	Y	Y	0Y
7 Banda Aceh	Gampong Jawa	N	N (built by BRR with TRWMP DED)	Y	N	Y	1Y
8 Aceh Jaya	Gunung Tanggoh (Calang)	Y	Y	N	N	Y	0Y
	Baba le (Lamno)	Y	Y	N	N	Y	0Y
9 Meulaboh	Lapang	N	N	Y	N	Y	1Y
	Pasie Aceh	Y (built by BRR)	N	N	N	Y	0Y
10 Nagan Raya	Batee Puteeh	Y	Y	N	N	Y	0Y
	Alue Letam, NR	Y (built by BRR)	N	Y	N	Y	0Y
11 Sabang	Lok Batee	N	N	N	N	Y	0Y
12 Nias	Migahill	N	N	N	N	Y	0N
	Bakaru	N	N	N	N	Y	0Y
	Teluk Belukar	Y	N	N	Y	N	0Y
13 Nias Selatan	Hilitobara	Y	Y	N	N	Y	0N

*Closed is defined as: Landfills/dumpsites that have one or more cells closed properly (or engineered)

Total number of districts supported by TRWMP = 13. Total number of locations supported by TRWMP = 22

Total dumpsites upgraded/rehabed to interim landfills = 10 (see next sheet)

Total number of new interim landfills = 5 - Nias Sel, AJ x 2, Nagan Raya, Jantho)

Total of permanent landfills = 4 - TB, BB, Bireuen, Pidie

Total closed = 6 - AU, Pidie x 2 sites, Bireuen, BA, MeI

Total no longer in use (either because open dump was closed or because site was abandoned) = 4 - Migahill, Nias Sel, Benteng Beach, Mutiara

Annex 10: SITE PHOTOGRAPHS