

Annex 6 - Housing Sector

Pre-assessment Situation

The national population of 290,000 is dispersed among about 200 inhabited islands spread over a distance of more than 900 km. The average population per inhabited island outside the capital city Male is around 1000. Some islands such as Male or to a lesser extent Kandholhudhoo have a high population density, other islands a population below 150. Around 29% of the population excluding Male' is supposed to live on densely populated islands, while 10% of the inhabited islands have of population of less than 250. Such diversity and spatial dispersion leads to the need for planning development strategies at various levels.

Outside Male' the average dwelling is estimated to be around 14 years old and to have an average built up area of about 1500 square feet. It is very common for the major part of the house not to have a ceiling. Typically dwellings would have a cement floor, plastered walls and either galvanized-, corrugated- or asbestos sheet roofs. Secondary characteristics include the presence of a compound (>90%), rainwater tank (>75%) as well as a septic tank (>75%).

1. Maldives Housing and Urban policy. Under the Sixth National Development Plan, GOM has embarked on a relocation program called the *National Population Consolidation Strategy and Program*. Under this strategy, regional focus islands are created serving the Northern and Southern atolls. In addition, 85 atoll focus islands have been selected to receive a high order of services. The other inhabited islands, called primary islands would receive a minimum level of services and population would be encouraged through various forms to move toward the focus islands. The objective of the regional development strategy is to obtain economies of scale in delivering services, in particular health and education but also transport, electricity and telecommunication. It would also aim to lower country vulnerability to sea level rise due to climate change, made even more sensitive with the last event.

2. Land use planning and building regulations are under the responsibility of MHUDB. Planning regulations require that land use plans for any island or area be divided into separate land use zones. The main ones are residential areas, institutions and general services, sport and recreation, commercial and industrial areas, infrastructure and utilities and environmental protection zones. Regulations related to plot uses have not yet been drafted. MHUDB also permits non residential uses on the plot after housing needs have been met, while it does not permit fish processing.

3. Building code requirements concern environmental regulations (building ventilation, natural light), building height limits for Male, and the existence of boundary walls. At present the total proportion of multi-storey dwellings is estimated to be less than 20% though increasing. Outside Male' this around 15% of island population is estimated to be living in multi-storey dwelling. The code forbids the use of coral as concrete aggregate.

Damage Assessment

4. Emergency situation. Over the total of 250,000 persons living in the islands affected by the tsunami, 29,000 persons were displaced the day following the event, and, currently 6,681 people are homeless in their own islands and 5,801 are displaced in other islands. The total number of homeless and displaced is 12,482. In addition to these displacements, other families whose houses have suffered extensive damage have been sheltered at friends' or relatives'.

5. The quantitative assessment on housing has been carried out by the islands and consolidated at the emergency center. Draft results were made public a few days after the tsunami, showing a rapid response to disaster. Since then, engineers have started to survey the islands to fine tune the damage assessment. The data below do not yet include the result of the technical survey, and should be updated shortly. The wave damaged structural and non structural elements of the houses, breaking boundary walls and facades, and indirectly subsided land, leading to the collapsing of houses in the absence of foundations. On the other hand, resilience to the wave of public buildings such as schools or health centers proved much higher. Based on the preliminary assessment, they only suffered minor damages, mainly non structural.

6. Damage assessment includes the direct cost for housing reconstruction or repairs and the indirect costs including temporary shelters and debris removal. The direct damage refers to the total or partial destruction of housing, and is exclusive of the cost of furniture or housing equipment which has been considered separately. The individual water tank, estimated at USD300, has been included but not the septic tank which cost has been taken into account in the sanitation sector. The estimate is based on an average housing unit of 2 to 3 bedrooms, with an area of 60 sqm. Unit prices for construction provided to the mission vary from 3200Rf/sqm¹ (USD250/sqm), to 4500Rf/sqm² (USD350/sqm).

7. The cost of partially damaged housing is difficult to estimate. However, in a technical estimate done jointly by UNDP & a private company with the participation of Government engineers in two affected islands (Nalafushi & Muli) the unit cost for repair of partially damaged houses vary from USD 4000 to 5000.. Hidden damage or lack of land stability can increase the repair cost with time. The technical survey will bring more accurate figures and one approach is to assess the damage in the units in detail , and increase the number of units for repair, and decrease the number of units to be fully reconstructed. The mission will then use Rf. 75,000 for repair of per unit partially damaged house .

8. Temporary shelters are of two types. A total of 638 tents were provided for the very short term, up to 2 weeks, in addition to temporary communal shelters , 40 emergency shelters for 160 people each are being built on the islands. The unit cost of these emergency shelters is of Rf 300,000³. Debris and rubble will be removed from the sites but will remain on the islands. The cost is therefore considered marginal. Some islands have already started to sort the debris so that some recycling could be contemplated. Sterile debris could also be used for sea protection works.

Mitigation measures.

9. The mitigation measures described below have been identified in relation to the Maldives risk exposure to climate change. As stated in the main text, the history of natural hazards is limited in the Maldives, which have suffered storms and tidal waves of moderate level. The latter one is subject to amplification with climate change and may become in the future a main issue for the low-lying and most vulnerable islands. The mitigation program in relation with housing would then follow a 3 prong-pattern

- People relocation to safe areas. This solution is of higher efficiency in terms of risk management but could also be lengthy and sensitive. It is totally consistent with the *National Population Consolidation Strategy and Program* presented above and will be implemented on a voluntary basis. Thus, even with incentives, its implementation can require some time. There is information

¹ Figures provided by MACI, Maldives Association of Construction Industries, based on a 2004 residential units project. The cost of a 1400sf (126sm) unit was of Rf 400,000.

² From MHUDB

³ Information provided by the emergency center, Minister of Planning.

that few islands⁴ have requested relocation to safer islands. . Beyond these islands, the mission suggests to provide detailed information to the families on the reconstruction alternatives so that they would be able to make an appropriate choice. Urban development in these islands is planned with high level of prevention such as sea defense works, emergency shelters in adapted community centers.

- Reconstruction on site. For the population willing to remain on site, the approach for reconstruction should aim at mitigating the risk. First, reconstruction should comply with regulations, such as land use planning, and building codes, as in the previous case. Siting of the housing unit should be preceded by an assessment of the zones of high vulnerability, and reconstruction limited in these areas. Finally, it could be necessary to provide the population with additional measures such as shelters in public buildings. However, the level of protection would be limited in this case.
- Building code and planning code. A pertinent and well enforced legal and regulatory framework is the basis of a good risk management strategy. From a preliminary review by the mission, only the building code would need some adjustment.⁵ The mission suggests a short study of the complementary requirements that would be necessary to ensure better structural stability. The study could be based on (a) the lesson drawn by the structural resilience of public buildings during the disaster, (b) recommendations for sustainable design and building approaches, with reuse of construction materials, and use of environmentally sound materials, and (c) the need for a satisfactory trade-off between stronger structure and acceptable housing cost. The land use plans may need to be revised to adjust the zoning to an updated hazard mapping based on the most recent data.

Reconstruction strategy

10. The proposed reconstruction strategy is based on exceptional arrangements originated in a total loss of assets and income from a substantial part of the population. The mission noted that the Government is willing to take a large share of the housing reconstruction cost, providing the affected families with acceptable and liveable housing conditions, and therefore, giving the population the possibility to re-start their activities rapidly. Indeed, such a strategy would provide an overall benefit for the country economy, which main resources, such as tourism and fisheries, have been harshly affected by the disaster. However, this strategy should not jeopardize the Government new policy orientation to develop a private participation in housing finance. In the longer term and beyond the emergency situation, the sector development would benefit from a better share of the housing cost between the public and the private, and the government objective to develop a comprehensive housing finance system should continue.

11. Strategy principles. The objectives of the reconstruction program should be (a) acceptable to the population in terms of household expectations, and (b) acceptable to the government in terms of budget and time frame. It would not be advisable to select generous reconstruction principles that would largely meet population expectations but would take many years to implement due to different constraints, and thus leave part of the population in temporary shelters for long periods. In this framework, the Bank would advise to look for solutions that include as much as possible community participation in the

⁴ According to MPND, eighteen islands had agreed to be reallocated, prior to the tsunami.

⁵ In particular, the choice of construction material could raise some issue. Almost all roofs are made of some type of metal sheet, in which the use of asbestos is supposed to be very common. Regulations may need to be adjusted. In addition, the water and sanitation issues should be addressed, securing that people use 'safe' drinking water and do not discharge sewage and human waste into the groundwater. Furthermore plot size should be adaptable to household-size to ensure a minimum of living standard in terms of space per individual.

reconstruction effort. From the experience of other countries in similar cases, the household participation could be envisaged through labor, the government providing construction materials, or through housing expansion, the government providing core units. The Bank recommends that the conditions be simple to facilitate the implementation but still adapt to various needs. Design criteria should adapt to the size of family of specific needs but in a limited range of options.

12. The GOM reconstruction strategy is yet to be defined. The mission had the opportunity to discuss two alternatives. The first one, proposed by some islands, would provide all affected families with 2 bedroom core units of 60 sqm. In addition, and according to specific situations, the Government would propose (a) a compensation of Rf 7,000, or (b) a larger house, or (c) a larger plot. The final product would therefore be adapted to specific needs, such as financing activities with creation of workshops or tree plantation, or addressing the need for larger families. The second one, presented by a private architect, proposes the construction of core housing units of 59 to 71 sqm at Rf 2025/sqm, as a first stage. The construction includes basic masonry building envelope with plaster and paint finish on the exterior, roofing with corrugated system, indoor unfinished walls, bathroom unit and basic kitchen equipment. The total cost would be of Rf 144,000 and could be constructed in 6 months.

13. In both cases, the population direct contribution would come from the potential expansion of the housing unit. Another indirect contribution that the Government should seek is to encourage the hiring of local labor by the construction companies. This solution would supply resources to unemployed households and reduce the need for foreign labor immigration.

14. Identification of beneficiaries. In cases of emergency such as this one, the selection criteria can be directly linked to the loss of asset, and made independent from the income. However, reconstruction should be prioritized to inhabited houses. If some families had moved to Male or other islands previously to the tsunami, the reconstruction of their house is not a priority. The mission suggests that the households database would be updated with information providing from the technical survey, size of family and specific data. The database should also be completed with the information on families living on affected islands and ready to be reallocated to safer islands. Based on discussion with MPND and after identification of four islands ready to be reallocated, an additional figure of 334⁶ new housing units has been taken into account as an indirect cost of the reconstruction program.

15. Land title. The proposal to provide all families relocating to focus islands with land titles is being considered by the GOM

16. Housing unit design and construction. As discussed above, a proper choice of construction materials and housing unit design is an important step in the risk mitigation process. The reconstruction program will follow the same construction standards than the *National Population Consolidation Strategy and Program*, with foundation, concrete structures, masonry and metal roofing. However, the mission emphasizes the need for construction quality control, at the design level, as well as the completion stage.

17. Construction sector. In addition to the budgetary constraint, the reconstruction program could face another stumbling block with the limited capacity of the construction companies. From discussions with MACI, the mission understood that the construction companies could undertake the construction of 1700 housing units in the short term if (a) the construction sites are limited, (b) the companies would exclusively address the housing needs, and (c) additional supply of engineers and labor would be supplied. Considering the additional need in infrastructure and tourism and the dispersion of the damage in many islands, the probability to have a bottle neck is high. Thus, the assistance of foreign companies

⁶ Islands of HDh Nellaidhoo, M Madifushi, Dh Vanee, Th Gaadhiffushi . Preliminary figure to be adjusted with the exact number of families living in the island.

and skilled labor to the local companies seem a necessary step. In addition, all administrative and bureaucratic steps, such as quota authorization for foreign labor, should be adapted to avoid delays.

18. Recommendations. The Bank recommendations are based on the preliminary damage estimate for housing which represent a large part of the total reconstruction cost. It may be needed then to consider some alternatives to increase efficiency, address the limited capacity of the construction sector and reduce the costs:

- Consult with families to ensure that recovery addresses their concerns and priorities in the context of island planning and housing design.
- Promote appropriate designs with various economic brackets, and possible requirements for house based industries like fish processing (smoking) and bread fruit processing and other homebased productive work.
- Promote self help repair and provide the households with architectural assistance or, at least, with a booklet of technical guidelines.
- Propose import tax waiver for families undertaking self help repair on their house.
- Propose tax waiver on construction materials for private sector who would be involved in the reconstruction process.
- Promote hiring of local labor by construction companies.
- Facilitate the administrative procedures to construction companies, such as quota authorization, and

Reconstruction cost. Based on the proposed recommendations of the reconstruction program, the cost can be fine tuned as follows. The low hypothesis unit price for reconstruction have been adjusted to Rf 2500 /sqm based (plus the water tank of Rf 300 per unit) on more modest construction standards and potential economy of scale due to the large quantities. The unit size is of 60 sqm, and housing compensation costs of Rf 7,000 have been added to the previous estimate, as well as housing construction for the 334 households of partially devastated islands that decided to be fully relocated. The high hypothesis is to provide units of 60 sqm at a unit price of Rf 4500/sqm without compensation.

Table 1: Estimated Losses and Financing Needs for Housing in Maldives (Rufiyaa thousands)

Item	Number of Units	Losses		Costs of Reconstruction		
		Unit Costs for 60 sq. meter. house	Total Costs	Number of Units (1)	Unit Costs for 60 sq. meter. house	Total Costs
Houses Completely Destroyed	1847	250.0	461,750.0	2,300	250.0	575,000.0
Houses Partially Destroyed	3500	75.0	262,500.0	3,200	75.0	240,000.0
Cost of Temporary Shelter				40		12,000.0
Sub-Total			724,250.0			827,000.0
Cost Contingencies @15%			108,637.5			124,050.0
Total in Millions Maldives Rufiyaa			832.9			951.1
Total in Millions of US Dollars			\$64.8			\$74.0
Resources Required till June 30, 2005			\$19.4			\$22.2
Resources required July 31 2005 to December 31, 2007			\$45.4			\$51.8

Notes: (1) Number units for full reconstruction are greater than for the units destroyed because of the need to relocate some people to other islands because their islands of origin are no longer livable.