



KEP PROTECTIVE EMBANKMENT

Sub-Project ID: 3.4c

INTRODUCTION



Deliverables	<ul style="list-style-type: none"> • Utilise material excavated from O Thmar reservoir (investment 3.4) to construct a raised flood defence embankment along the seaward side of the Kep to Angkaol road. • A 6-kilometre embankment that performs a dual function – a) to protect the unpaved road and the area on its landward side (which is earmarked for investment) and b) to create a natural barrier between the road and the mangrove to provide protection and enclosure – disincentivising encroachment and illegal cutting
Beneficiaries	8,566
Budget	US\$ 126,150
Location	Protects Angkaol commune from sea level rise and flooding from storm surges and clearly delineates boundary of mangrove to prevent further mangrove loss

Problem statement

For a distance of approximately 6 km along the coast between Kep and Angkaol there is an area of low-lying land that has often flooded from the sea in the past and is likely to experience more frequent flooding in future because of sea-level rise and storm surges associated with climate change. A shallow embankment and unpaved coast road have been constructed in recent years, separating the remaining mangrove from land which is being used for agriculture and development, including future development in the tourism industry. This road is up to 10m wide in places. This investment will use some of the material excavated from O Thmar Reservoir (investment 3.4a) to construct a 1m high embankment along the seaward side of this road, to improve the standard of protection offered by the road embankment and to clearly demarcate the edge of the mangrove to prevent further incursions into the mangrove area. The embankment would therefore serve the dual purpose of protecting the valuable mangrove habitat (which is particularly valuable in this area for crab spawning, thereby supporting the local fishing industry, in addition to the protection benefits it provides) and also providing improved flood protection to the hinterland.

Location

Kep province, Kep and Angkaol Communes

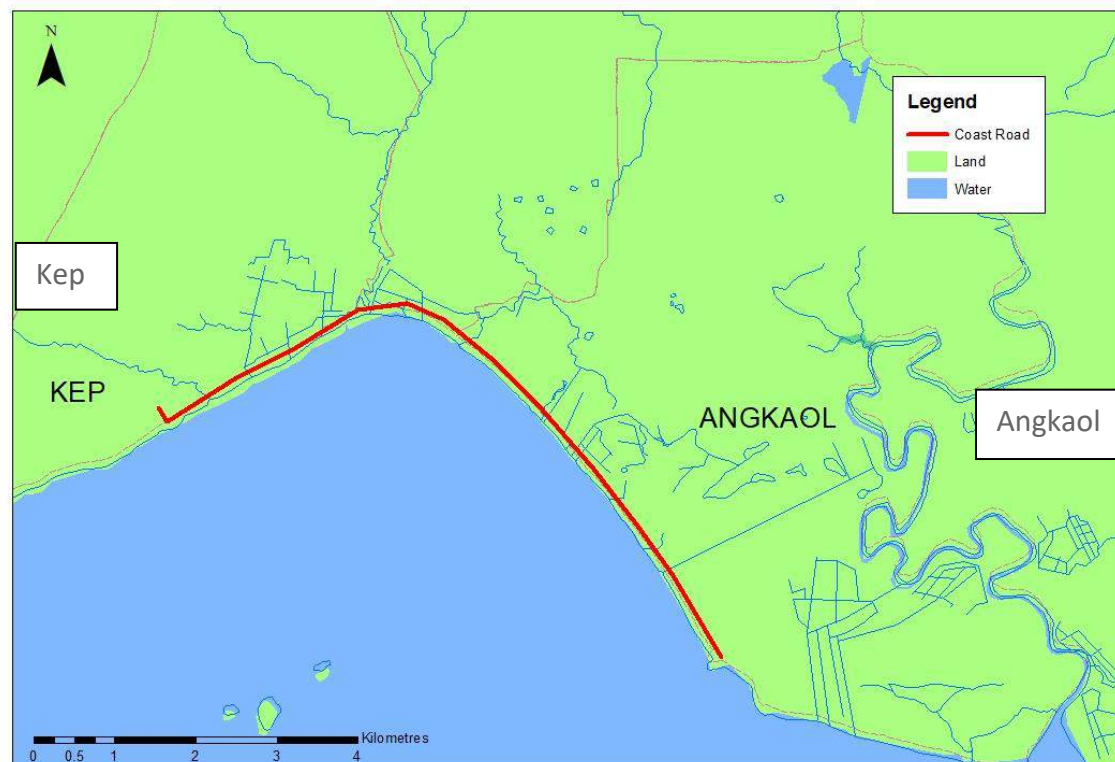


Figure 1 “Map 1 Location of the Kep to Angkaol Coast Road”

Beneficiaries

There are a reported 8,566 residents in Angkaol Commune, which is spread across a large, rural area of very low topography exposed to the sea on its south-west side and to a tidal river, the Kampong Trach, to its east. These residents are mostly employed in agriculture and fishing. Although construction of the road along the coast, and higher defences inland, has helped to alleviate the risk of sea water flooding (and consequent salinization) to crops there is still remains an increasing risk of the road being overtopped with expected sea level rise and storm surges. There is also a need to affirm the delineation of the mangrove, to prevent further mangrove loss. The fishing communities at Kep and Angkaol are largely dependent on crab fishing, and the mangrove provides valuable spawning grounds for the crabs.

BUDGET

Construction cost of the Kep Protective Embankment

There is no material cost as the material is to be sourced from the excavation of O Thmar reservoir. The only costs will therefore be transport and labour.

It is assumed that transport will be in rigid 8-wheeler tipper trucks carrying 8 m³ of material each. These vehicles do not need a crane or grab to offload them – they can simply deposit the material where required and then the labourers will distribute and compact it. The average journey length by road from O Thmar to the coast road is 16 km. Approximately 15,000m³ of material will be needed, requiring 1,875 truck loads resulting in a maximum total of 30,000 HGV km.

DESCRIPTION	QUANTITY	UNIT PRICE	COST
Transport of material from O Thmar (16km)	1,875 journeys	\$ 50	\$ 93,750
Labour (skilled)	180 working days	\$ 30	\$ 5,400
Labour (unskilled)	1,800 working days	\$ 15	\$27,000
TOTAL			\$ 126,150

DATA COLLECTION

Note that this activity was originally proposed by the Kep Provincial Department of Water Resources and Meteorology. It was discounted from the original proposal because the material procurement costs relative the number of beneficiaries would be too great. However, it was re-considered after comments were received from the Adaptation Fund regarding the approximately 108,000 m³ of material to be excavated from O Thmar (Investment 3.4a). A telephone call took place with stakeholders in Kep, including the Director of the Department of Water Resources and Meteorology and the Department of Environment to confirm that the activity would still be viable. Based on these discussions, the activity is proposed as described in this sheet. This investment provides the both the adaptation benefits described above, and helps to alleviate the environmental and social safeguard risk arising from Investment 3.4a.

Consultations

The following governmental organisations were consulted:

16-10-2018 – Kep Municipality

17-10-2018 – Kep province Department of Water Resources and Meteorology

18-10-2018 – Angkaol Commune

The existing road embankment was visited and was observed to be forming a clear line between the land being developed inland of the road, and the mangrove to the seaward.

Site Records

To the landward side of the coast road is an area of rice paddies, residual mangrove and partly abandoned land formerly used as salt farms approximately 10 km² in extent, bordered by a new raised flood embankment at the north end and the existing slightly higher ground supporting the main road into Angkaol. If additional flood protection is offered along the coast road this land will become potentially more useful for food production.

IMPLEMENTATION

Design

The embankment will be a simple compacted hardcore and earth embankment formed on top of the existing gravel road surface. The existing road is observed to be approximately 10m in width, although with occasional narrower sections, so there is adequate width for the embankment to be constructed on the seaward side of the existing road without reducing road width to below 4m.

It is assumed the material will be suitable for compacting to a 1 in 2 side slope profile which will enable a 1m high crest level for a footprint of only 4m width. This gives a cross-section of 2 m², and over the 6km length of the embankment this will utilise 12,000 m³ of material. Where sections of the road are narrower it may be necessary to use more material in order to build the embankment out slightly on the seaward side of the road. The budget requested allows for transport and placement of 15,000 m³.

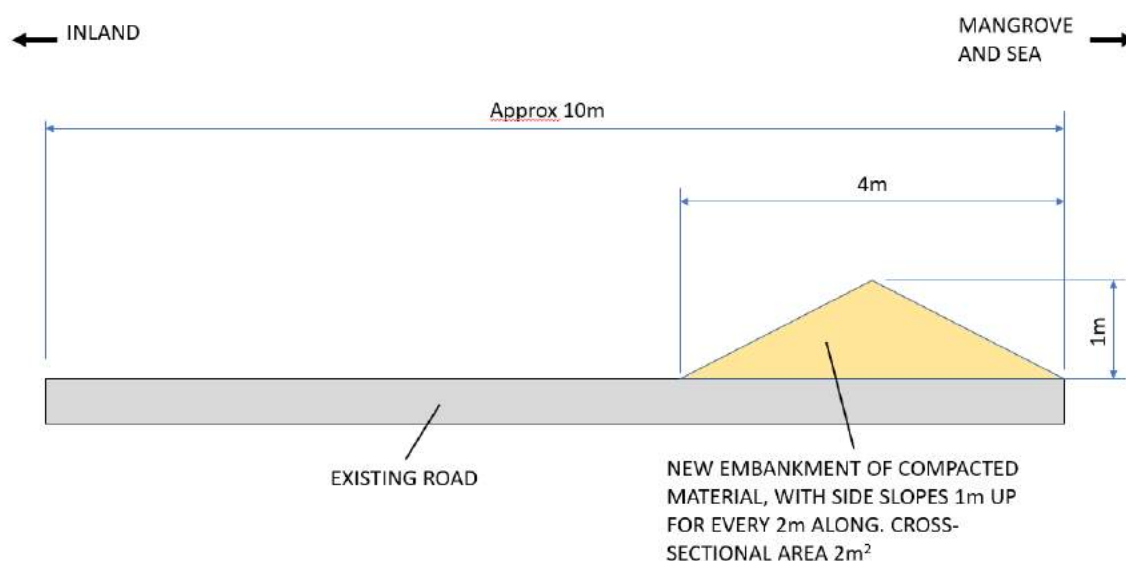


Figure 2 “Indicative cross-section of the existing road and new embankment”

Community Engagement

The local community have been proactive in requesting measures to manage and maintain the mangrove, and also prevent sea flooding which causes salinization of the crops. They are expected to be fully supportive of the project. The contractor must ensure that any disruption to the local community during the works is minimised and, local people will be employed as labourers on the construction, in line with UN-Habitat's People's Process approach.

Construction

The work should be carried out concurrently with Investment 3.4, the excavation of high ground within O Thmar reservoir, as the material can then be simply transferred and placed as it is dug out from O Thmar. It is anticipated that the existing National main road network will be used, as local roads within Angkaol commune are not suitable for heavy traffic.

This would entail the work being undertaken in the dry season, which would also facilitate the placement and compaction of the material. There may be a need for continuing management of the embankment into the following wet season to ensure the compaction is withstanding the effects of heavy rainfall.

Key Risks & Safeguarding Issues

Table 1 accounts for all the Environmental and social safeguarding issues involved in the Kep Protective embankment. Re-use of material excavated from nearby O Thmar reservoir will satisfy the need to optimize resource efficiency and alleviate environmental and social safeguard risks at the O Thmar site (and arising from the project more generally).

PHOTOS



Figure 3 *"A section of the coast road with the proposed embankment sketched in orange. Note that the sea is on the right of the picture, behind the mangrove. This picture is taken in the direction of travel from Kep Commune, toward Angkaol Commune"*



Figure 4 *"The embankment would be constructed where the people are standing in this picture, on the sea-ward side of the road"*

Table 1*Environmental and Social Safeguard and risk mitigations incorporated*

ENVIRONMENTAL AND SOCIAL SAFEGUARD PRINCIPLE	RISK MITIGATION ACTIONS INCORPORATED IN THE DESIGN
<p><i>Compliance with the law</i></p> <p>projects/programmes supported by the Fund shall be in compliance with all applicable domestic and international law.</p>	<p>The coast road and the mangroves are public state-owned land. The land side of the road is private land, but construction will not take place there.</p> <p>All actions concerning the construction of the embankment have checked and are compliant with relevant national laws, as detailed in the proposal Part II, Section E.</p>
<p><i>Access and Equity</i></p> <p>Projects/programmes supported by the Fund shall provide fair and equitable access to benefits in a manner that is inclusive and does not impede access to basic health services, clean water and sanitation, energy, education, housing, safe and decent working conditions, and land rights. Projects/programmes should not exacerbate existing inequities, particularly with respect to marginalized or vulnerable groups.</p>	<p>The improved flood defence will affect all the community in an equal and positive way. Improved delineation of the mangrove will provide equal benefits for the crab fishing communities of both Kep and Angkaol.</p>
<p><i>Marginalised and Vulnerable Groups</i></p> <p>Projects/programmes supported by the Fund shall avoid imposing any disproportionate adverse impacts on marginalized and vulnerable groups including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS. In screening any proposed project/programme, the implementing entities shall assess and consider particular impacts on marginalized and vulnerable groups.</p>	<p>The provision of the embankment will not marginalise vulnerable groups.</p>

Human Rights

Projects/programmes supported by the Fund shall respect and where applicable promote international human rights.

There is no evidence to suggest that human rights will be violated. Rights issues concerning land, women, labour and indigenous people are addressed separately in this sheet.

Gender Equity and Women's Empowerment

Projects/programmes supported by the Fund shall be designed and implemented in such a way that both women and men 1) have equal opportunities to participate as per the Fund gender policy; 2) receive comparable social and economic benefits; and 3) do not suffer disproportionate adverse effects during the development process.

In the poor communities affected by the proposal it was observed that women tend to take more of a household and community management role and therefore they are likely to benefit further from any measures that can improve the community's crop yield, as they will be likely to take on the role of selling surplus crops. Improved crop yield in coastal areas is a secondary benefit of this investment.

Men and women will be given equal opportunity to provide their labour to the construction process, under the [People's Process](#) approach. Whenever women provide their labour, the project will ensure that they have access to separate bathrooms and hygienic products.

All labourers (male and female) employed under the project will be given a mandatory briefing on the prevention of sexual harassment and exploitation prior to commencing their work.

Core Labour Rights

Projects/programmes supported by the Fund shall meet the core labour standards as identified by the International Labour Organization.

There are no specific risks to core labour rights resulting from this investment. However, the following safeguard provisions will be made.

Safety equipment will be required for workers on the site and provided for them.

This activity will draw upon unskilled labour from the community. All workers in the project will be informed of their rights to organise, including joining formal labour unions, in accordance with the law. Unskilled labourers will be paid \$300 per month (assuming an 8-hour working day, 5 days per

	<p>week, this is 50% higher than the national minimum wage).</p> <p>All workers employed by the project (including under agreement of cooperation) will be aged 18 or over)</p>
<p>Indigenous People</p> <p>The Fund shall not support projects/programmes that are inconsistent with the rights and responsibilities set forth in the UN Declaration on the Rights of Indigenous Peoples and other applicable international instruments relating to indigenous peoples.</p>	<p>There is no evidence of indigenous people or undocumented migrants in the target area, and consequently there is no risk that the activities will affect indigenous people.</p>
<p>Involuntary Resettlement</p> <p>Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids or minimizes the need for involuntary resettlement. When limited involuntary resettlement is unavoidable, due process should be observed so that displaced persons shall be informed of their rights, consulted on their options, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.</p>	<p>The works all involve work on public state-owned land and are accessed by public roads.</p> <p>There are some informal settlement areas on the seaward site of the road, towards the Kep Commune end. These communities will not be affected as the construction begins after the settlement ends.</p> <p>There is privately owned land (some of which is occupied, some of which isn't or is earmarked for future investment). This land will not be affected by the construction, which takes place on the seaward side, except for the inconvenience of passing trucks.</p>
<p>Protection of Natural Habitat</p> <p>The Fund shall not support projects/programmes that would involve unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.</p>	<p>The embankment will help to further protect and delineate the mangrove area between the road and the ocean. This will provide habitat benefits.</p>

Conservation of Biological Diversity

Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids any significant or unjustified reduction or loss of biological diversity or the introduction of known invasive species.

By helping to delineate and protect the mangrove, the embankment will assist the conservation of biological diversity, especially of plant and aquatic life that depends on mangrove ecosystems, notably crabs, which are abundant in coastal waters near Kep.

Climate Change

Projects/programmes supported by the Fund shall not result in any significant or unjustified increase in greenhouse gas emissions or other drivers of climate change.

The embankment will increase the resilience of the population to climate change. While the construction operation will involve some machinery, the works will be a short-term operation only.

Pollution Prevention and Resource Efficiency

Projects/programmes supported by the Fund shall be designed and implemented in a way that meets applicable international standards for maximizing energy efficiency and minimizing material resource use, the production of wastes, and the release of pollutants.

The materials to be used will be tested at O Thmar before leaving the reservoir (this is included in investment 3.4). This will ensure suitability for purpose and also to ensure that any material which is contaminated can be disposed of safely elsewhere. Re-using the material within the same locality (mostly within the same commune of Angkaol) minimizes transport costs, maximizes resource efficiency and minimizes the environmental and social risk inherent in disposing of materials.

Public Health

Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids potentially significant negative impacts on public health.

The improvement in sea flood defence will help to improve food supply and is not anticipated to have any negative effect on the health of the community.

No hazardous materials or chemicals will be used in the construction.

Physical and Cultural Heritage

Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects/programmes should also not permanently interfere with existing access and use of such physical and cultural resources.

There is no evidence of physical, cultural or intangible heritage at the site

Land and Soil Conservation

Projects/programmes supported by the Fund shall be designed and implemented in a way that promotes soil conservation and avoids degradation or conversion of productive lands or land that provides valuable ecosystem services.

The improved embankment provides means to the local community to improve the land available for cropping by reducing instances of salt water ingress.

Please see pollution prevention and resource efficiency for information regarding the embankment fill.