



Papua New Guinea's progress towards climate compatible development



Vanuatu, March, 2011

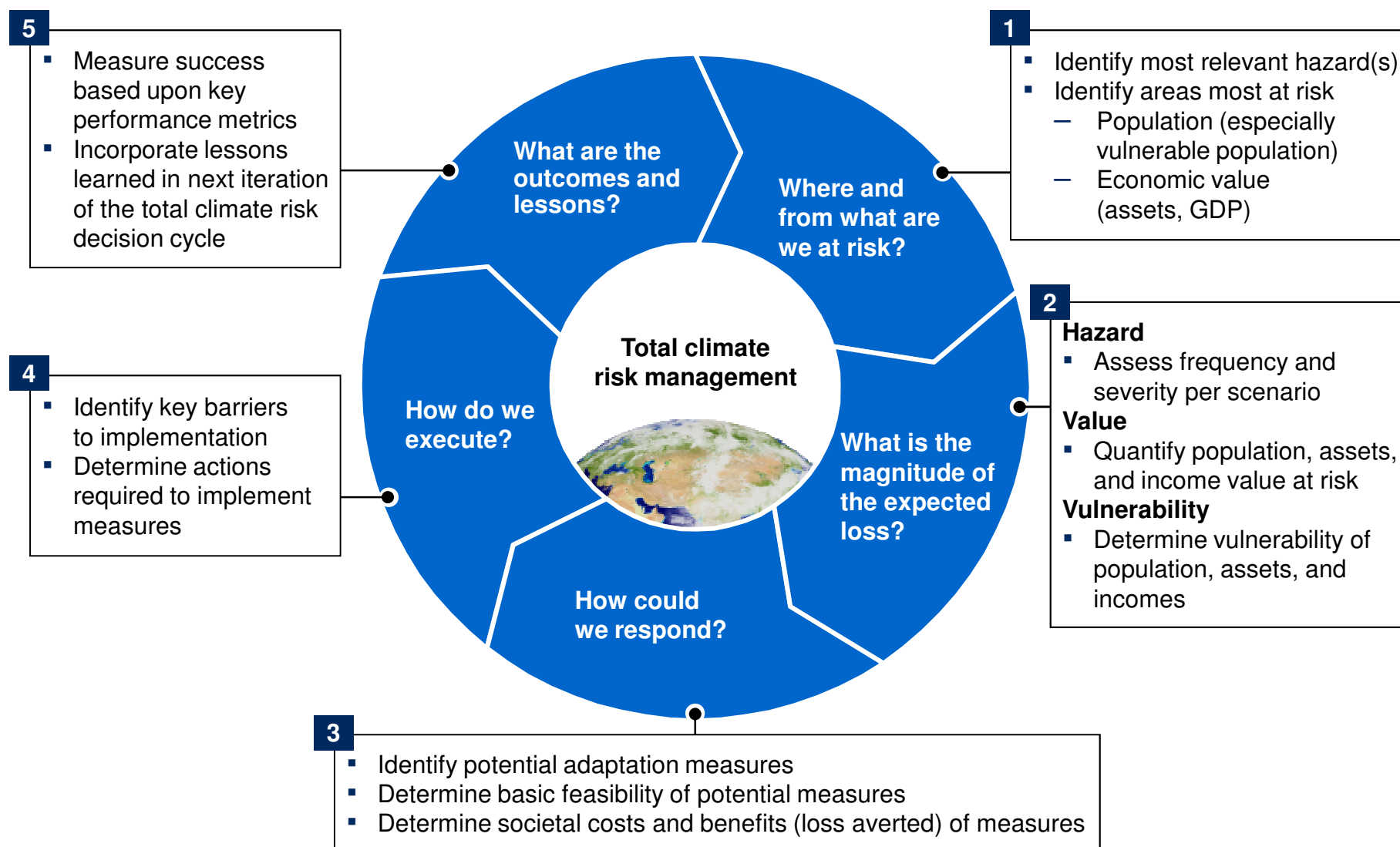
Not to be quoted without permission of the Office of Climate Change and Development



- **PNG's approach to adaptation**




- Vulnerability analysis
- Cost efficient solutions
- Current implementation

PNG's National Adaptation Strategy evaluates climate change hazards based on a risk management methodology












Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

Multiple hazards will be aggravated by climate change

-  Risk exposure and loss estimation
-  Risk exposure only
-  Not included for analysis




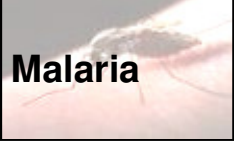
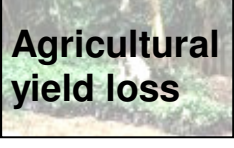

PNG is prone to event-driven natural hazards ...

... but also faces hazards due gradual shifts as a result of climate change

 <h3>Coastal flooding, sea-level rise</h3> <ul style="list-style-type: none"> Already a serious and regular phenomenon Strong relationship to climate change 	 <h3>Inland flooding</h3> <ul style="list-style-type: none"> ENSO and rainfall are strong drivers Moderate link with climate change 	 <h3>Landslides</h3> <ul style="list-style-type: none"> Irregular phenomenon Main impact in highlands Linked to rainfall intensity and land use 	 <h3>Malaria and vector-borne diseases</h3> <ul style="list-style-type: none"> 1.7 m malaria cases (30% of pop.) p.a. Increasing temperature and rainfall are largely accepted as factors that increase malaria infection rates
 <h3>Volcanic eruption</h3> <ul style="list-style-type: none"> Severe threat, recur at least every decade No recognised link with climate change 			 <h3>Agricultural yield change</h3> <ul style="list-style-type: none"> Agriculture is 25-30% of GDP and main livelihood for 80% of the population Yields affected by climatological changes and CO2 fertilization – the effect differs by crop and location
 <h3>Earthquake</h3> <ul style="list-style-type: none"> Severe threat, recur at least every decade No recognised link with climate change 			 <h3>Storms</h3> <ul style="list-style-type: none"> PNG is too close to equator for major tropical storm (typically originate > 10°)

Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

Three priority hazards were selected for detailed analysis

Hazard	Risk exposure
 <p>Coastal flooding</p>	<ul style="list-style-type: none"> Affects ~6,000; displaces ~400; and kills several people annually Damages buildings
 <p>Inland flooding</p>	<ul style="list-style-type: none"> Affects ~26,000; displaces ~8,000; and kills several people annually Damages buildings and property
 <p>Landslides</p>	<ul style="list-style-type: none"> Affects 500-600 and kills ~10 annually, mainly in remote, mountainous areas Damages infrastructure
 <p>Malaria</p>	<ul style="list-style-type: none"> Epidemics will affect ~200k more people in the highlands Highland cases are more severe
 <p>Agricultural yield loss</p>	<ul style="list-style-type: none"> 3 million people depend on climate-sensitive crops Climate change may reduce yields
 <p>Coral reef decay</p>	<ul style="list-style-type: none"> ~70,000 people earn a living from reefs Decay/ bleaching may reduce this

Top priority hazards to be addressed



Already affects almost half the population, with Climate Change impacting ~200k more



PNG is vulnerable to coastal flooding, only to be exacerbated by rising sea levels

- 20,000km of coastline and
- Severe floods affecting 6,000+ annually,

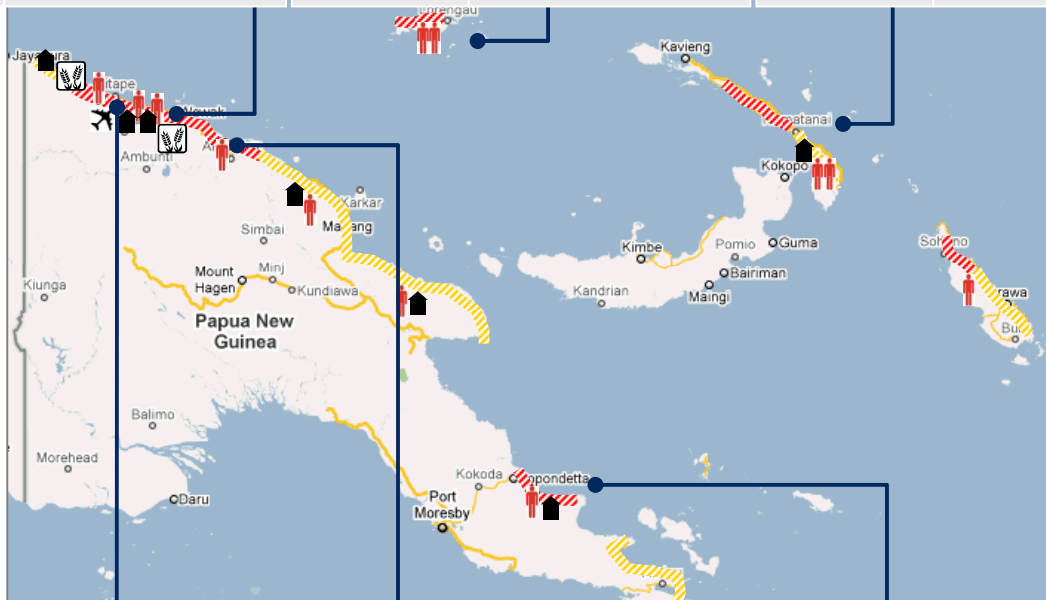


PNG suffers inland floods multiple times per year

- Extensive river system
- Population living close to rivers

Today, we focus on coastal flooding since PNG already suffered from six major historic coastal flooding events between 1995 and 2009

East Sepik		2008	Manus		2008	New Ireland		2008
Tidal waves hit the northern coast of Papua			Tidal waves hit the northern coast of Papua			Tidal waves hit the northern coast of Papua		
A: 20,000	USD: 15,000,000		A: 20,000	USD: 15,000,000		A: 20,000	USD: 15,000,000	
D:	2,800 homes damaged		D:	homes		D: 1,200	1,500 homes damaged	
M:			M:			M:		
K:			K:			K:		



Place	Date	
Cause		
Affected	USD:	
Displaced		
Missing		
Killed		
	People	Damage

- High risk zone
- Moderate risk zone
- Affected people (< 10,000)
- Affected airports
- Affected buildings
- Agriculture
- Estimated information

Aitape, West Sepik		2002	West Sepik		1998	Oro province, Milne Bay		2007
Small tsunami generated by an earthquake			Tsunami following a magnitude 7 earthquake			Cyclone Guba associated with several days of rain		
A: 4,400	USD: 12,000,000		A: 10,000	USD: 12,000,000		A: 15,000	USD: 50,000,000	
D:	Homes, cash crops, food gardens		D:	Homes, agriculture, airport		D: 1,300	Homes	
M:			M:			M:		
K: 3			K: 2,182			K: 10		

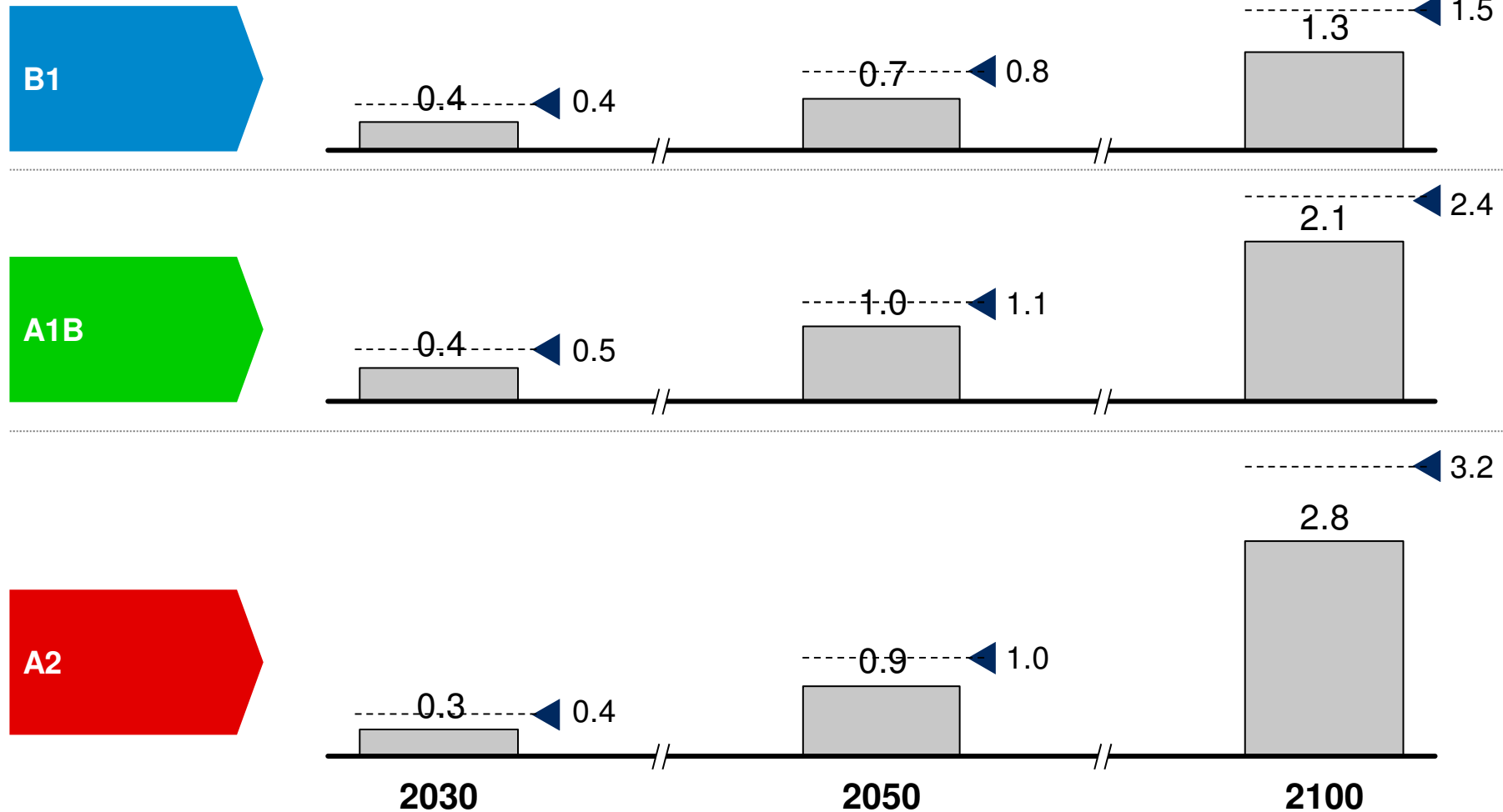
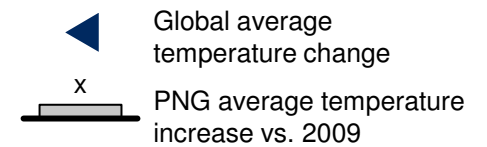
Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM



- PNG's Approach to adaptation
- **Vulnerability analysis**
- Cost efficient solutions
- Current implementation

1 Temperature increase due to climate change is lower in PNG compared with the global average

Temperature forecast vs. 2009, degrees Celsius

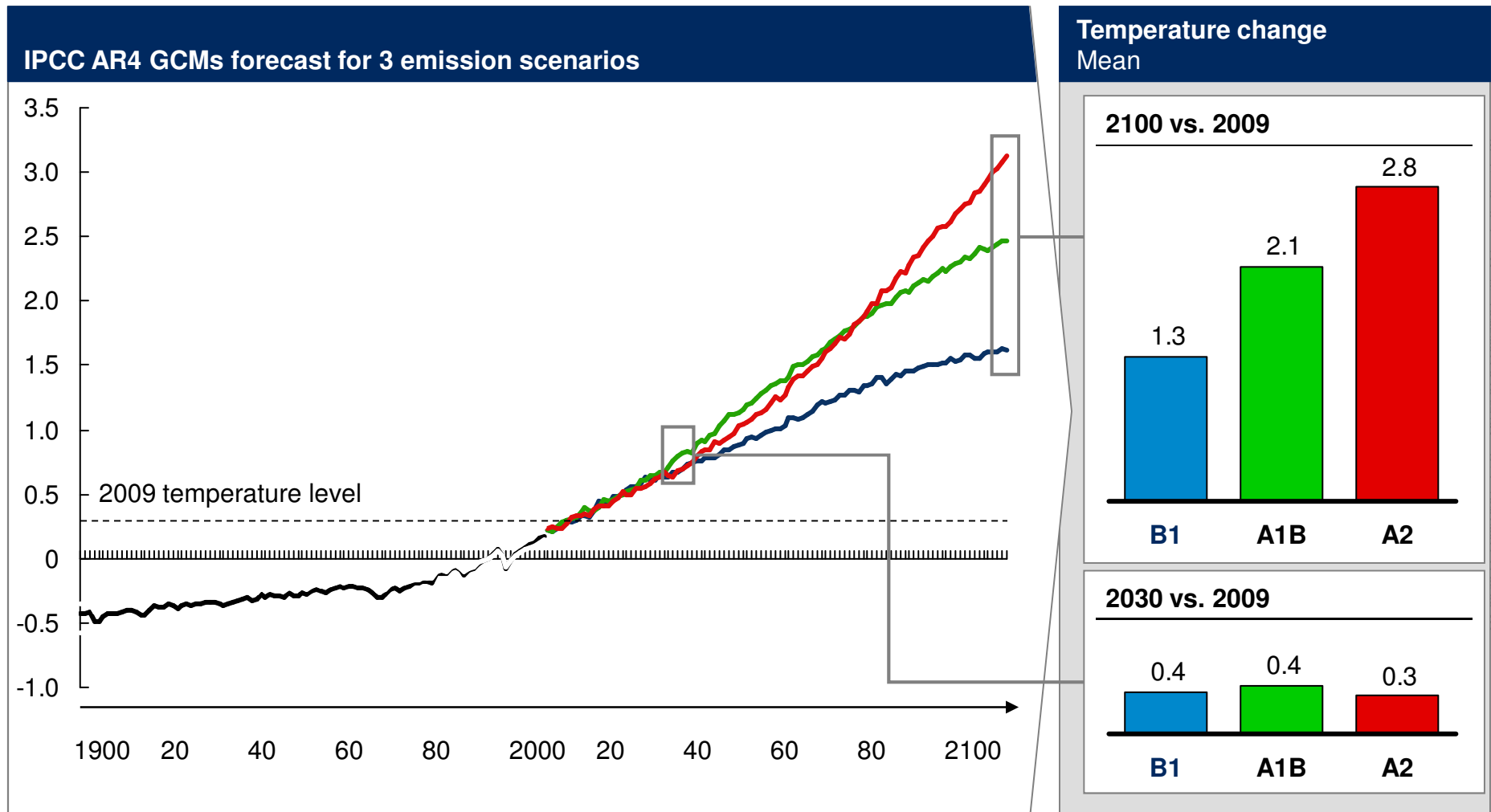


Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

1 The "worst-case climate change" scenario A2 in 2030 has lower temperature increase than other scenarios

Papua New Guinea, degrees Celsius

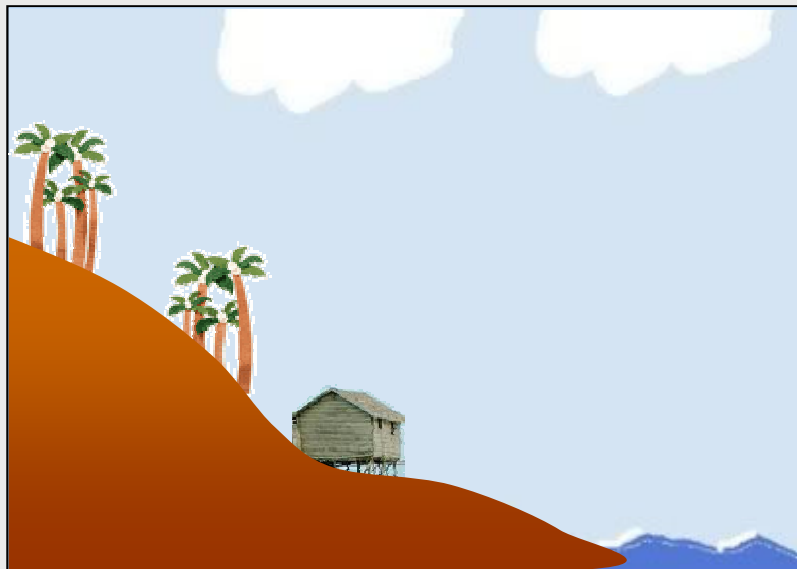
Emission scenarios
— B1
— A1B
— A2



To determine the 'Expected Loss' from coastal flooding we analyse the hazards, value of assets and likely vulnerability

ILLUSTRATIVE

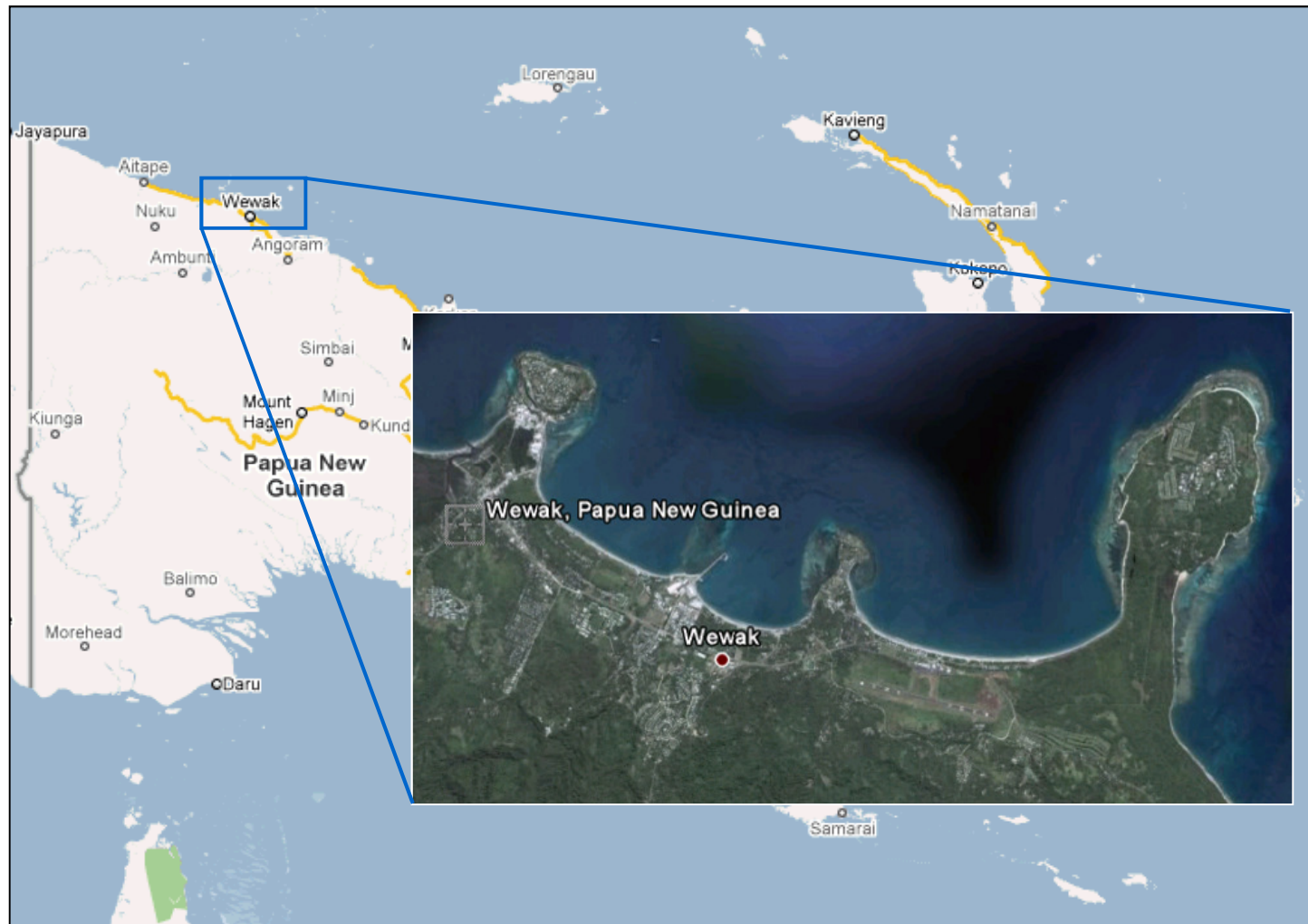
Example – coastal flooding



Hazard severity/frequency	Example
Probability that a severe coastal flood will happen in a given year	10% chance of coastal flood
×	
Value of assets	
The value of the house	House value of 2,000 USD
×	
Vulnerability of assets	
The portion of the value of the house lost – depends on flood height	20% of the house damaged
=	
Expected loss estimate	
The expected value of the house lost in one year due to coastal flooding	40 USD loss expected per year

Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

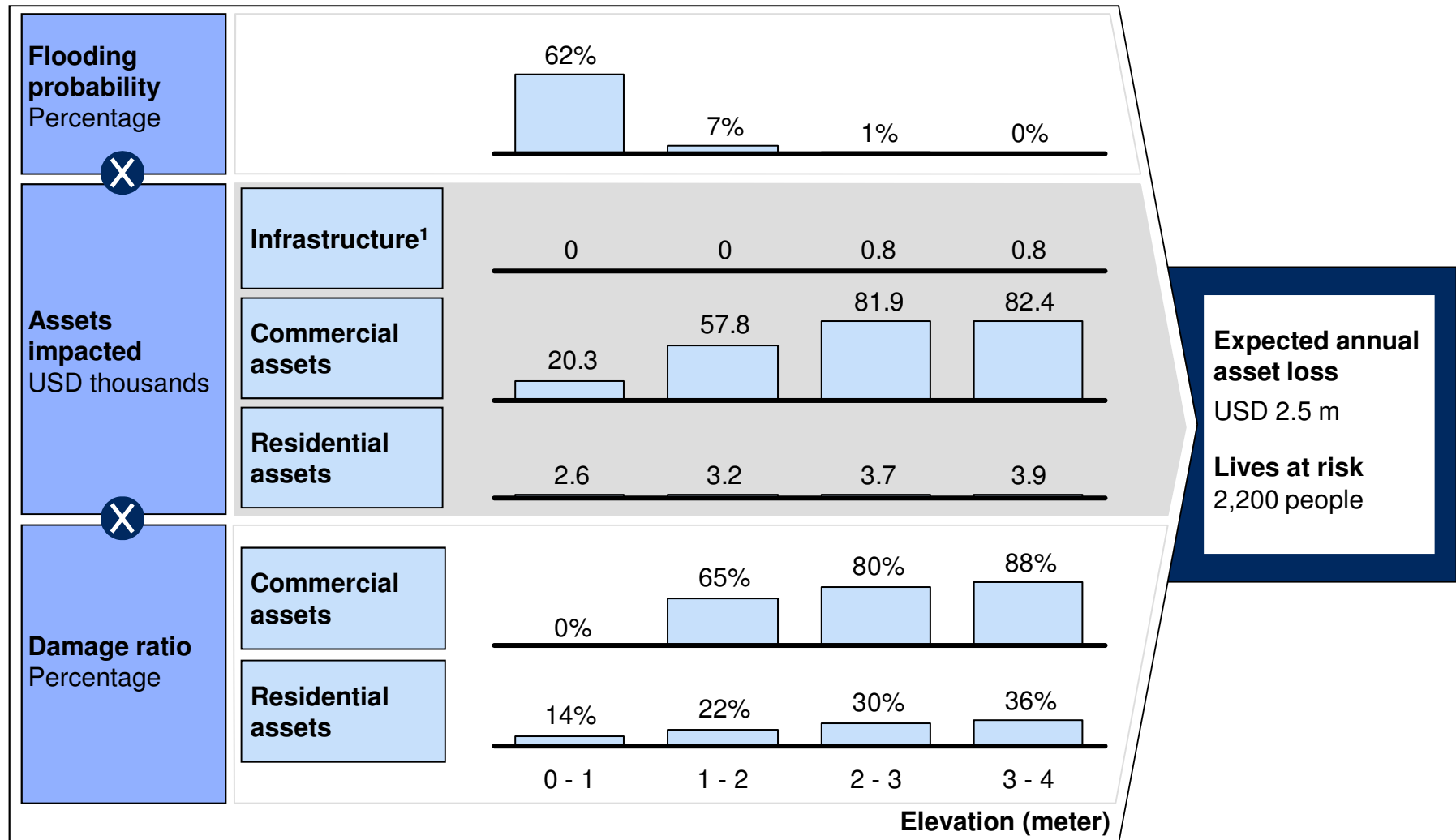
The town of Wewak was chosen as one of the 'hot spots' for in-depth analysis as a flood-prone and high economic activity city



Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

Commercial assets are most at risk in Wewak for coastal flooding

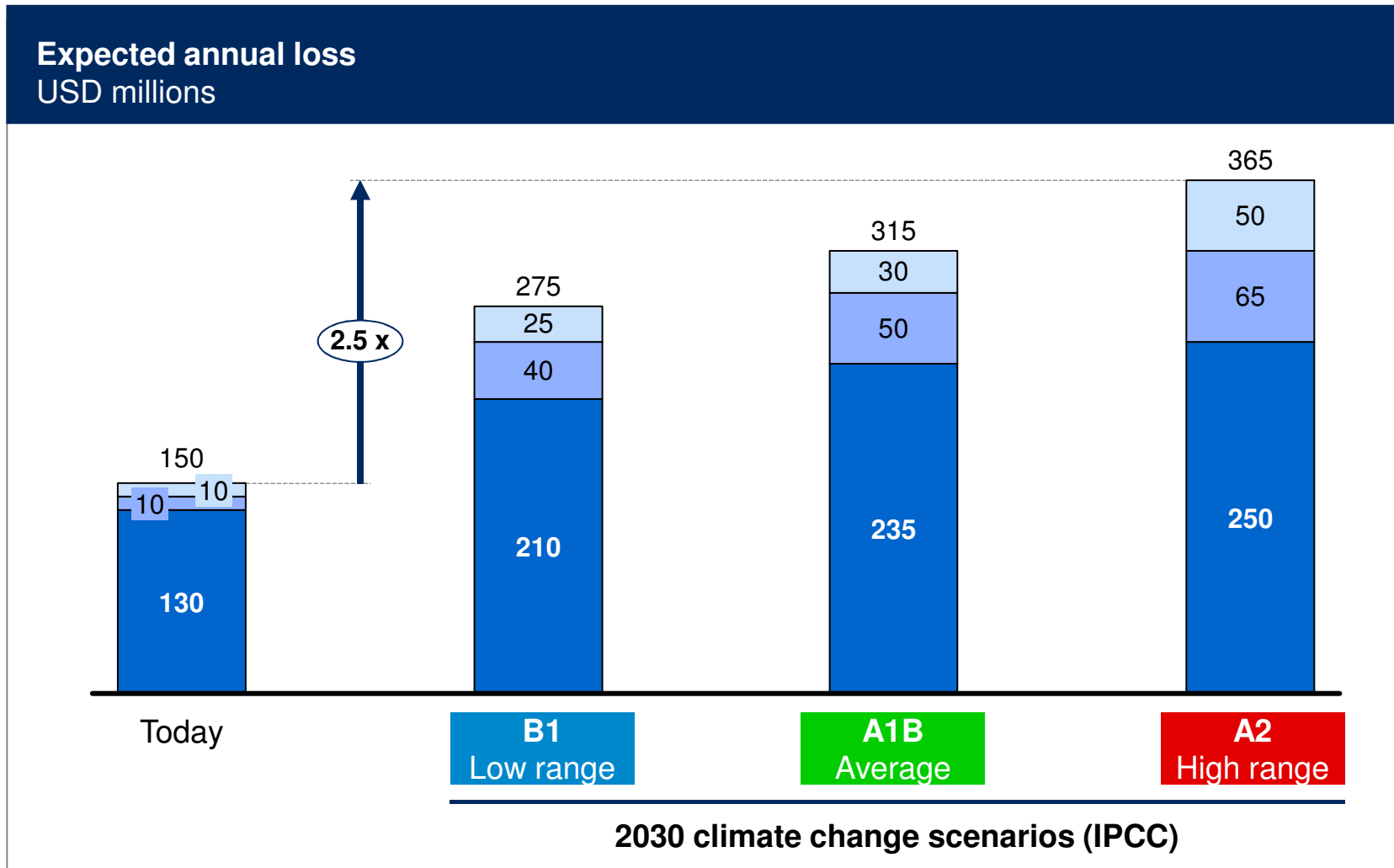
Case example: Wewak, 2010, no climate change



1 Infrastructure limited to airport repair cost

2 In the worst-case scenario, expected estimated loss as a result of climatic hazards will increase by 250%

- Inland flooding
- Coastal flooding
- Malaria

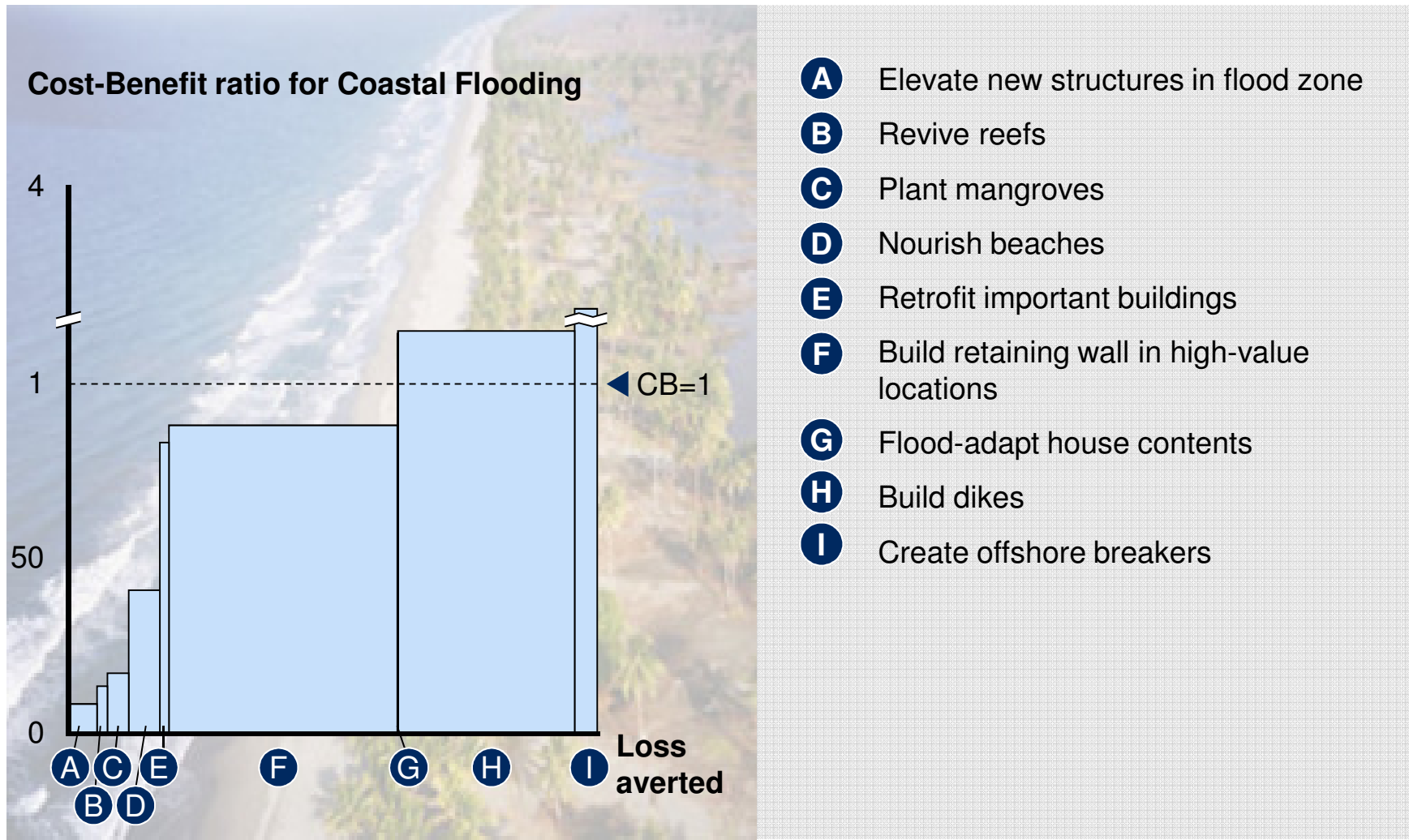


Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

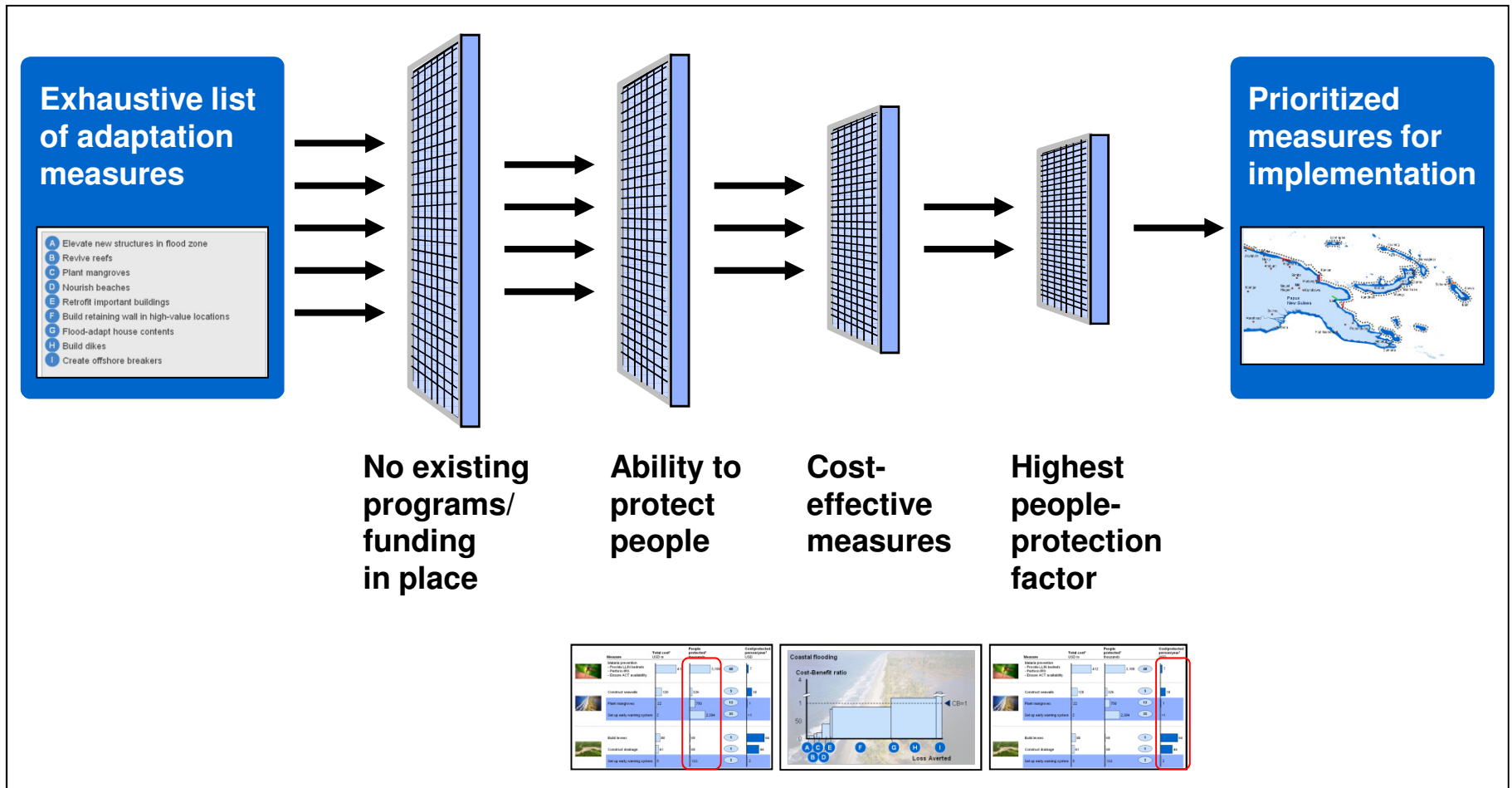


- PNG's approach to adaptation
- Vulnerability analysis
- **Cost efficient solutions**
- Current implementation

A cost curves was developed to quantify the cost effectiveness of different coastal flooding





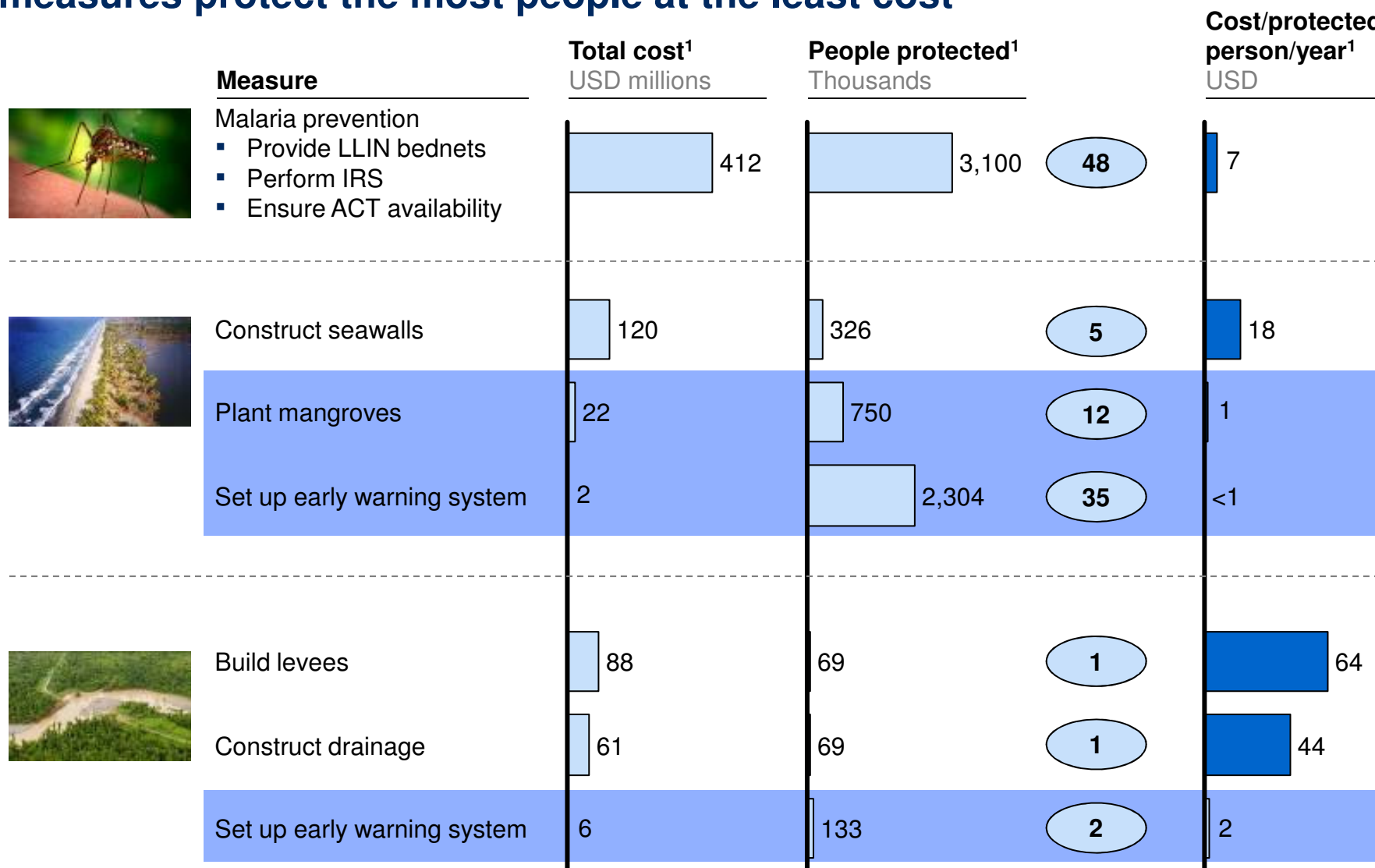
Measures for immediate implementation are prioritized by considering cost-effectiveness, people-protection ability and absent programs



Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

Early warning systems and community-based mangrove measures protect the most people at the least cost

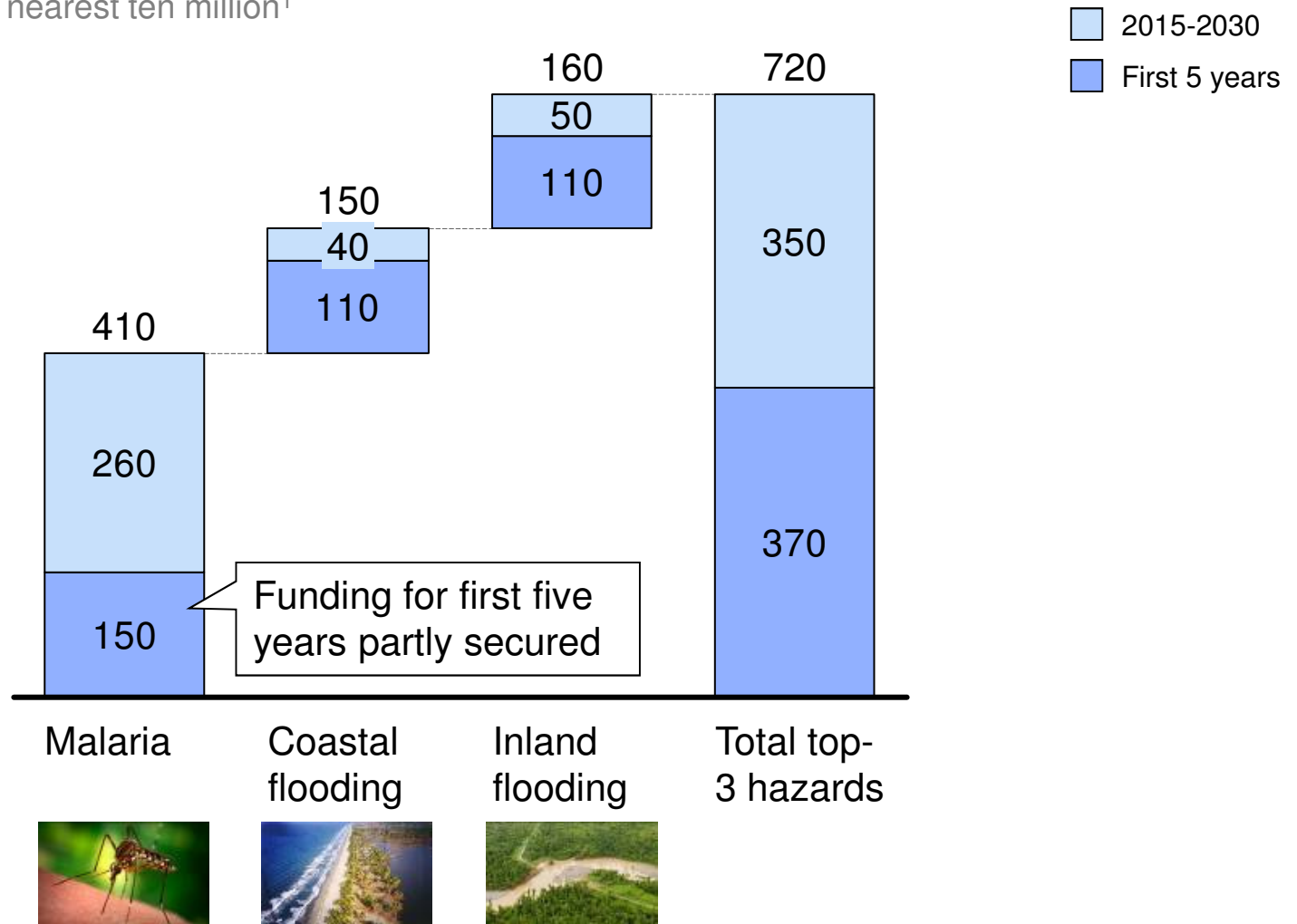
 Priority measures
 Protected/total population



¹ National aggregation based on local estimates (high margin of error)

Based on this bottom up analysis, we have quantified what it would take to protect the whole country from the top three hazards,

USD million, rounded to nearest ten million¹

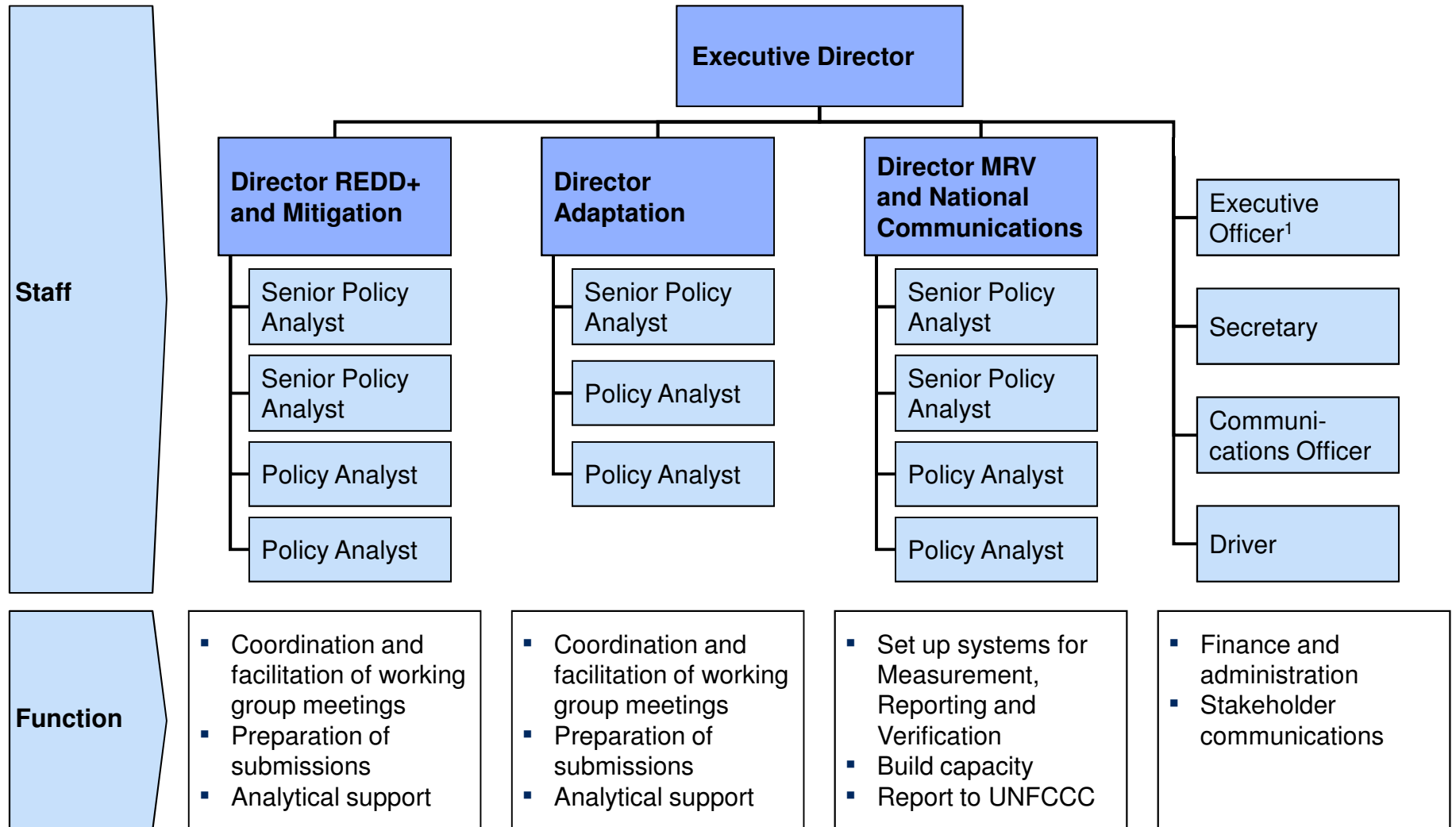


¹ National aggregation based on local estimates (high margin of error)



- PNG's approach to adaptation
- Vulnerability analysis
- Cost efficient solutions
- **Current implementation**

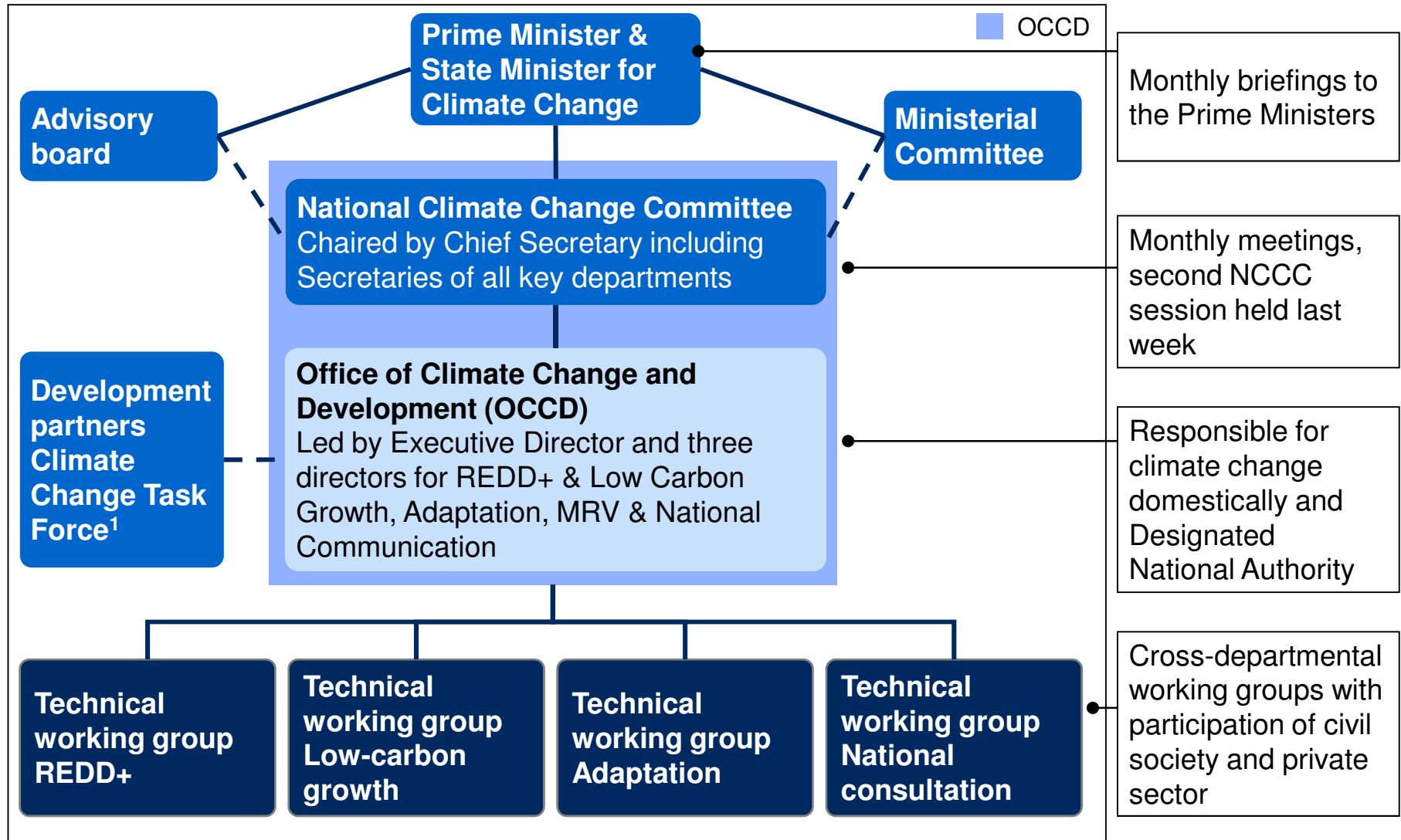
The new Office of Climate Change and Development (OCCD) was established in 2010 to coordinate PNG's climate change efforts ...



Working Draft - Last Modified 2/25/2011 2:12:57 PM Printed 2/24/2011 11:25:39 AM

¹ Most financial and administrative functions will be handled by the Prime Minister's Department, in conjunction with the Executive Officer

... and a governance structure has been put into place to guide the work of the Office



¹ Chaired by the Executive Director of the OCCD, members include EU, UK High Commission, AusAID, UNDP, JICA

Adaptation Technical Working Groups drive the identification and implementation of adaptation and policy measures



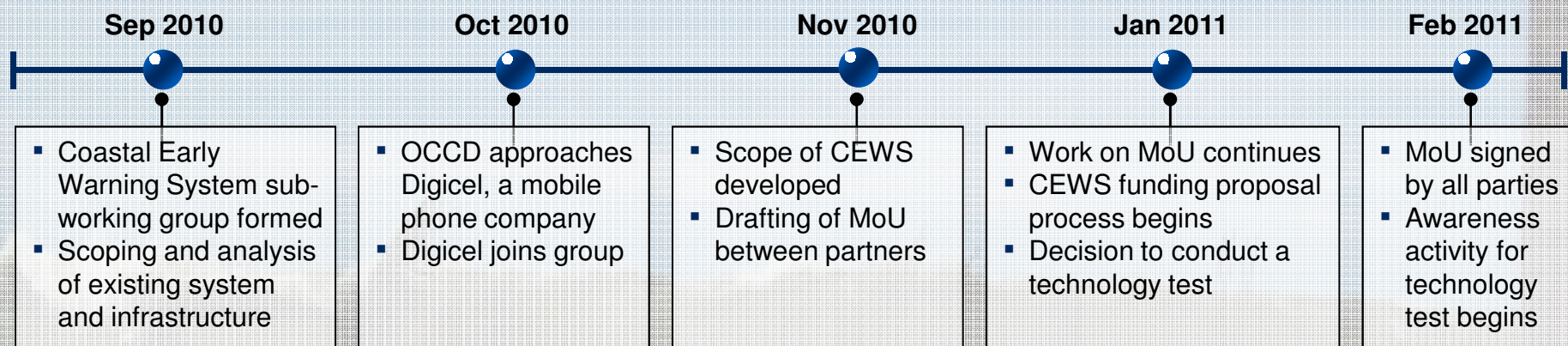
What are the Technical Working Groups?

- Bi weekly meetings of experts and stakeholders on solving specific adaptation challenges e.g.
 - Coastal Early Warning System
 - Mangrove protection
- Participants include government and non-government stakeholders e.g.
 - Departments of Environment, Climate Change, Weather Service, Disaster Center
 - NGOs (WWF, WCS, TNC), Universities

What do they do?

- Guide, support and review the analysis of the Office of Climate Change e.g. identify and prioritize measures to protect PNG against coastal flooding
- Support the implementation of high priority adaptation measures (e.g. coastal early warning system)
- Develop and suggest appropriate policy measures

The Coastal Early Warning System (CEWS) sub-working group has made rapid progress and is on course for a full roll-out in H1 2011



- **The National Disaster Centre (NDC) leads the CEWS sub-working group**, which comprises government and non-government departments and agencies involved in disaster risk management in PNG.
- **Digicel is the CEWS technology provider**

- **The National Disaster Centre** is part of the Department of Provincial & Local Government Affairs, and exists under legislation to provide the necessary and appropriate disaster management services to government and the people of Papua New Guinea.

- **Digicel**, a mobile phone network, was approached to be the technology provider due to their existing experience in coastal early warning systems, having helped raise a tsunami alert across the Pacific on 2 March 2010
- Speaking about Digicel's efforts, Digicel Pacific CEO, Vanessa Slowey said, *"With telecommunications operations in six markets within the region Digicel Pacific was delighted to be able to play its part in raising awareness of the Pan Pacific Tsunami alert"*

The Mangrove sub-working is currently investigating the key challenges faced at each stage of a proposed mangrove planting initiative

Training & Awareness

Awareness

- **Convey need and benefits of mangroves to communities**
 - Materials
 - Site visits
 - Alternative livelihood training

Training

- **Develop skills of project coordinators and community members for all stages of a mangrove planting project**
- **Develop best practice while also accommodating site specific requirements**

