Introduction and Background

Rinsap is a developing country in Southeast Asia with a rapidly growing export-oriented economy. The country's most important exports are agricultural products, especially rice, aquaculture products, especially shrimp, and manufactured items, such as clothing. Rinsap is now the fifth biggest rice producer and third biggest rice exporter in the world; currently, approximately 70% of rice produced in Rinsap is sold for export. This represents a striking change from three decades ago, when Rinsap experienced widespread food shortages and was a net importer of food.

Despite a sharp decline in poverty rates in recent years, rural areas remain poorer and less developed than urban areas. Many rural residents, especially young people, are moving to Rinsap's cities and pursuing work in non-agricultural sectors. The national government has begun setting policies aimed at shifting the economy’s base from agriculture to industry, both to alleviate rural poverty and to make the country more competitive globally. Under these policies, rice exports are expected to remain important for Rinsap’s economy, but industrial exports are expected to eventually surpass rice exports in value. More rice will be sold on the domestic market to protect national food security, which remains a government priority. Last year agriculture contributed 20% to the national GDP, down from 25% just five years ago.

The Bien Gio River Delta

The Bien Gio is a major river in the region. Its delta is located in Rinsap’s densely populated Eastern Region, which is home to almost 20 million people, or about 25% of Rinsap’s population. The Eastern Region, commonly referred to as the Bien Gio Delta, is composed of ten primarily rural provinces. The major city in the region, Thoy Bat City, is becoming an increasingly important industrial, distribution, and commercial center.

The Bien Gio Delta lies at low elevation – much of it lies at less than one meter above sea level. Land in the delta is heavily utilized for agriculture and, increasingly, aquaculture. Today, over half of Rinsap’s food is produced in the delta, including 60% of its rice, 70% of its aquaculture products and 75% of its fruits. Consistent with national trends, approximately 70% of these products are exported. The productivity of the Bien Gio Delta accounts for almost one third of Rinsap's national GDP, despite its relative lack of development as compared to urban areas.

Rice is the most important crop grown in the delta, although shrimp farming has been gaining importance, in part because shrimp is a more lucrative product for delta farmers. Many shrimp farms have been created through the removal of coastal mangroves; an estimated 200,000 hectares of mangrove forests have been removed for shrimp farming alone. (Approximately 100,000 additional hectares of mangroves have been removed for...
other purposes, including dike construction and the creation of agricultural land, leaving approximately 70,000 hectares of mangrove forest remaining in the delta region today.

Climate conditions in the delta region do pose challenges to food production. Like the rest of Rinsap, the delta region has two seasons: a rainy season and a dry season. Annual flooding during the rainy season is vital for rice crops, although intense rains and storm systems can cause major floods that destroy crops, homes, and infrastructure. By contrast, during the dry season water levels in the Bien Gio River decline significantly, allowing far more saltwater to enter the delta than during rainy seasons. As saltwater reaches further inland, it can destroy freshwater crops like rice and contaminate drinking water.

It is widely agreed in Rinsap and by the international scientific community that the Bien Gio Delta is one of the areas most vulnerable to climate change, especially sea level rise.

Rising seas are expected to submerge some areas of the delta and worsen flooding and saltwater intrusion in other areas. Higher sea level is also expected to worsen the impacts of storm surges.

National Climate Change Report

Recently, the government released the National Climate Change Report, which highlights the serious risks posed by climate change impacts on Rinsap, and especially on the Bien Gio Delta. The report outlines various scenarios for temperature change, precipitation change, and sea level rise, based on high, medium and low greenhouse gas emissions trajectories for the rest of the 21st century. The government has selected the medium emissions scenarios for use as the basis for creating climate change adaptation policies and plans. Nevertheless, the government recognizes that these are simply scenarios; the future will depend on a variety of critical determinants, such as future emissions reductions.

The report confirms that sea level rise is the most dramatic threat to the Bien Gio Delta, although temperature and precipitation changes will likely impact the region as well. The three most significant impacts of sea level rise are:

- Inundation (including complete submersion of some areas and increased flooding in other areas during seasonal floods)
- Increased saltwater intrusion
- Increased flooding from storm surges

The below map illustrates government estimates for which areas of the delta will be submerged and which areas will be flooded during each rainy season as a result of sea level rise.

[MAP STILL NEEDS TO BE INSERTED INTO THE TEXT.]
The government has highlighted the following findings related to sea level rise impacts on the delta, according to the medium emissions scenario:

**BY 2050**
Sea level could rise by 30cm, which would mean:
- 10% of delta land will be submerged
- 8% of the delta population (approximately 1.6 million people) will be displaced
- Rice production will decrease by 20%
- Shrimp production will decrease by 7%
- Loss of up to 10% of GDP as compared with today, due to food production losses and infrastructure damage

**BY 2100**
Sea level could rise by 75cm, which would mean:
- 25% of delta land will be submerged
- 20% of the delta population (approximately 4 million people) will be displaced
- Rice production will decrease by 45%
- Shrimp production will decrease by 15%
- Loss of up to 25% of GDP as compared with today, due to food production losses and infrastructure damage

**Figure 1**
Medium Emissions Scenario: Potential Sea Level Rise Impacts on Land, Rice, and People

The predicted food production losses from sea level rise would force Rinsap's government to either import food for domestic consumption or cut its food exports by an estimated 20% by 2050; Rinsap could no longer feed its own population and maintain current income levels from food exports.
The Global Fund for Climate Change Adaptation

A large multilateral organization has established a Global Fund for Climate Change Adaptation. The Global Fund will invest in activities that make developing countries more resilient and prepared for climate change. Given the vulnerability of the Bien Gio Delta’s agricultural sector to sea level rise, as described in the National Climate Change Report, the Secretariat has decided to allocate US$500 million specifically for use in the delta region.

Payments from the Fund are conditioned on recipient governments setting priorities for how the funds will be allocated. This priority-setting process must include consultations with various parties, including implementing government authorities, scientists, and citizens groups, such as farmer representatives. The Global Fund has said it will prefer to support initiatives that have the widest support among the different parties being consulted.

The Global Fund is ready to disburse the funds as soon as Rinsap’s government conducts its consultation process and develops its priorities. It has also indicated that it is not likely to make a second donation to Rinsap in the near future.

The question: what should be the priorities for allocating the donated funds?

Rinsap’s Prime Minister has asked a group of representatives from relevant government ministries, provincial governments, the scientific community, and the farmers union to meet and discuss recommendations for prioritizing the donated funds.

The Prime Minister wants to know where the group can find areas of agreement. He is asking the group to focus its discussion on the implications and potential outcomes of each approach. He is not asking the group to set specific funding levels for each priority, as he plans to make those decisions. He wants the recommendations by the end of today’s meeting.

In preparation for the meeting, the Planning and Development Ministry has outlined five categories of adaptation approaches for the group to consider; these approaches are described below. They can be prioritized as meeting participants see fit. Other options can be presented as well. The Planning and Development Ministry estimated how much each option would cost to make a meaningful investment.

A) Man-Made Protective Infrastructure: Dams, Dikes, Levees, and Embankments

Funds can be used to invest in protective infrastructure, such as dams, dikes, levees and embankments. These types of infrastructure can protect existing land, homes, farms, and businesses from sea level rise and saltwater intrusion by keeping sea water out of the delta. They can also protect against flooding further inland.
Protective infrastructure requires regular maintenance, and can be breeched or destroyed during major storms. In fact, some argue that building this type of infrastructure can decrease disaster preparedness by providing a false sense of security. There are already over 350 kilometers of dikes, levees and embankments in the Bien Gio Delta region, most of which require at least some degree of repair and/or improvement; improvements include strengthening and, in some cases, increasing height.

There is ongoing discussion among scientists about the environmental impacts of protective infrastructure. There is evidence that this type of infrastructure can increase erosion and damage ecosystems and habitats, particularly coastal wetlands. However, there is uncertainty regarding extent of these effects.

Cost Estimate for a Meaningful Investment: At least $250 million.

B) Natural Protective Infrastructure: Mangrove Restoration

Funds can be used to restore mangroves, which used to grow along much of the Bien Gio region’s coast. Mangroves provide natural protection against storm surges and erosion, and provide habitat to many species, including shrimp. There is also evidence that as their roots trap sediment, they can add volume to it, slowing the rate of sea level rise relative to areas without mangroves.

Many scientists emphasize that unlike man-made infrastructure like dikes and embankments, mangroves both provide protection and are beneficial to the environment. Nevertheless, researchers are currently studying the degree of sea level rise that Rinsap’s mangroves could tolerate before losing their ability to perform their natural functions and eventually becoming submerged.

Over three quarters of Rinsap’s mangroves have been destroyed, in large part to make room for shrimp farms. (Although mangroves provide shrimp habitat, man-made shrimp farms are more productive.) Replanting mangrove forests would therefore mean relocating existing coastal shrimp farms. Other land users would likely need to be relocated as well.

Cost Estimate for a Meaningful Investment: At least $150 million.

C) New Agricultural Technologies and Techniques

Funds can be used to invest in the development of new agricultural technologies and techniques. These technologies and techniques could help protect food security and farmers’ livelihoods by helping adapt delta agriculture to changing climate conditions. The Planning and Development Ministry has recommended focusing on biotechnology, water management technologies, and crop integration techniques.

Research suggests that biotechnology can be used to develop rice varieties that tolerate higher salinity and water levels while still producing high yields. There are also technologies being developed to better utilize water resources, such as improved water harvesting and well design methods. Research on new agricultural technologies has slowly
begun in Rinsap, and is moving more quickly in some other countries and international organizations. If these technologies were developed elsewhere, there is no guarantee that they would be quickly or cheaply transferred to Rinsap.

While there is little evidence of direct negative environmental impacts of genetically modified foods, some have suggested that consumers might resist purchasing genetically modified foods because of perceived health and environmental issues. This could lower the profitability of crops and limit Rinsap's food export market.

Crop integration techniques are already being used in the delta. In particular, some farmers now use integrated shrimp-rice farming systems, growing rice in rainy seasons and shrimp in dry seasons, but this practice is not widespread. Bringing this and other integration techniques to scale in the delta could help farmers in certain areas adapt to changing rainfall and salinity levels, allowing them to increase their incomes and protect against risks to one crop or the other.

Abandoning dry season rice crops and coastal shrimp monocultures would, however, decrease overall annual yields in the short term. Research is still being conducted on the environmental impacts of this type of crop integration, although the current research suggests that when done correctly, it is ecologically sustainable. Bringing crop integration to scale in the delta would involve constructing necessary infrastructure, such as shrimp ponds and buffer zones to separate crops, and would in many cases require training for farmers.

These technologies and techniques could help protect agriculture, allowing food production in the delta to continue, but only in areas not expected to be submerged or heavily flooded. They would not, however, protect residents themselves from direct climate impacts like land inundation, floods, and saltwater intrusion into drinking water.

**Cost Estimate for a Meaningful Investment:** At least $250 million.

D) Development of Non-Agricultural Sectors

Funds can be used to diversify rural livelihoods by investing in the development of non-agricultural industries. **This strategy would allow development in the delta to continue and could protect jobs in the long term,** compensating for large losses of agricultural land and jobs from sea level rise.

Development of non-agricultural industries is expected to reduce food production by diverting land and resources away from agriculture. On the other hand, alternative industries would provide non-agricultural jobs that could increase local incomes, create jobs, and potentially entice young people to remain in the delta. This approach would involve capital investments, investments in training and education for residents, and investments in transportation infrastructure like canals, road and bridges. Some residents would need to be relocated for construction of industrial and commercial zones and supporting infrastructure.
The Planning and Development Ministry has recommended including funds for a 
comprehensive delta land use plan, to ensure that new developments are sited in viable 
areas. Still, some argue that there is little value in developing industrial zones and related 
infrastructure in the delta area because of increasing vulnerability from intense storms 
surges and flooding.

Others have expressed concern that existing industries and urban areas are already 
causing pollution, particularly in water used downstream for drinking and agriculture. 
They caution against creating more pollution that could harm remaining agricultural areas 
and the environment.

*Cost Estimate for a Meaningful Investment:* At least $350 million.

E) Resettlement

Funds could be used to resettle residents away from areas predicted to be submerged or to 
experience very intense flooding. **This approach would help prepare for the abandonment of the areas most vulnerable to sea level rise,** leaving adaptation efforts 
to focus on areas that can be "saved."

This investment would involve helping residents in targeted areas move and find 
livelihoods in new areas, as well as an education campaign to inform them about the need 
to relocate. Investing in relocation now could make the resettlement of millions of 
residents more orderly. It would also help the government prepare for consequences 
related to relocation, such as higher infectious disease incidence due to increased 
population density.

Many residents are not prepared to abandon their land and farms, and would regard the 
intangible costs of this approach as very high. Many government officials have expressed 
concern about the political difficulties of asking people to leave their homes and land 
without an imminent, pressing threat to their safety.

*Cost Estimate for a Meaningful Investment:* At least $150 million.

**Meeting Participants**

The Prime Minister has asked representatives of eight ministries and organizations to 
participate in this consultative priority setting process. He has hired a professional 
facilitator to ensure the discussions are productive and to help the group reach agreement. 
Brief introductions to the participants are provided below:

*Planning and Development Ministry* – The national government authority with broad 
influence on all matters related to development. This ministry is considered one of the 
most powerful government agencies.
**Environment Ministry** – The national government authority on all matters relating to the environment and natural resources, including climate change. This agency was in charge of producing the National Climate Change Report.

**Agriculture, Aquaculture and Rural Affairs Ministry** – The national government authority on all matters relating to rural affairs, including agriculture and aquaculture. This ministry has a strong presence throughout the Bien Gio Delta via its local offices.

**Bien Gio Delta Provinces Coalition** – A coalition of the ten Bien Gio Delta provincial governments. Provincial governments are charged with implementing national policies within their provinces. They have some autonomy in adapting national policies to local realities, but cannot deviate from national mandates.

**University of Thoy Bat (UTB) Hydrology and Meteorology Research Institute** – A highly respected scientific institute focusing on the Bien Gio Delta’s water resources and weather patterns. One of its programs focuses specifically on climate change impacts on the delta.

**Rinsap National University (RNU) Agriculture and Aquaculture Research Institute** – A highly respected scientific institute focusing on agriculture and aquaculture technologies. Technical experts from this institute often work with farmers in the Bien Gio Delta.

**Bien Gio Farmers Union** – An organization representing farmers in the Bien Gio Delta, including both rice and shrimp farmers. Its mandate is primarily to communicate relevant government policies to delta farmers, although when possible it strives to convey farmer concerns and perspectives to government authorities as well.

**Secretariat, Global Fund for Climate Change Adaptation** – The Secretariat is in charge of managing day-to-day operations at the Global Fund, including mobilizing resources and managing donations. The Global Fund is eager to see Rinsap receive the $500 million.

**Professional Facilitator** – The facilitator has been hired to help participants prioritize the various adaptation approaches, and has no influence or stake in the decisions taken today.

**Simulation Instructions**

You will now be assigned to one of the roles introduced above. Ideally, you will take on a role that is different from your position in the real world. You will also receive confidential instructions that provide a more thorough introduction to the role you are playing, including your interests and initial positions. **You should not contradict what is in your confidential instructions, but feel free to improvise beyond them as the process evolves. In fact, improvisation is encouraged.**

Please review your confidential instructions and reflect upon the role you will play, including how it will shape your perspective on the issues at hand. If you have any questions or concerns, please feel free to raise them. The group will then convene for 2 ½ hours to discuss how to prioritize the donated funds.

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Tasks before the group

The group must discuss the following adaptation strategies and identify which ones enjoy the widest support:

- Man-Made Protective Infrastructure
- Mangrove Restoration
- New Agricultural Technologies and Techniques
- Development of Non-Agricultural Sectors
- Resettlement

When discussing each of these adaptation strategies, consider the following criteria:

- What are the long-term and short-term implications of these approaches for Rinsap?
- How do these approaches address the main sea level rise threats to the Bien Gio Delta: inundation, increased saltwater intrusion, and increased flooding from storms?