



WWF

REPORT

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2018

THE AYEYARWADY RIVER AND THE ECONOMY OF MYANMAR

Volume II: Ayeyarwady Futures

ACKNOWLEDGEMENTS

WWF Myanmar would like to thank U Htun Lwin Oo, the Director General of the Department of Water and River Improvement (DWIR) and his entire team for all of their support in organising the workshops across the country. Without them, we would not be able to share the diverse perspectives regarding the future of the Ayeyarwady with you.

WWF Myanmar would also like to thank WWF Germany who provided the funding for the River in the Economy Project. Without their support, we would not have the insights we now have to further develop the WWF freshwater strategy in Myanmar.

But most of all, thank you to the 200+ stakeholders who we engaged with over the course of the River in the Economy Project. Your insights, commitment and passion for the future of the Ayeyarwady were inspiring. We hope that this report can help raise your voices and concerns regarding the future of the basin, and bring us closer to a preferable, sustainable and equitable future.

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WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global Network active in more than 100 countries.

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by: conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

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INTRODUCTION

WWF Myanmar, through the River in the Economy project, brought together people from diverse backgrounds, to imagine what the future of the Ayeyarwady Basin could look like.

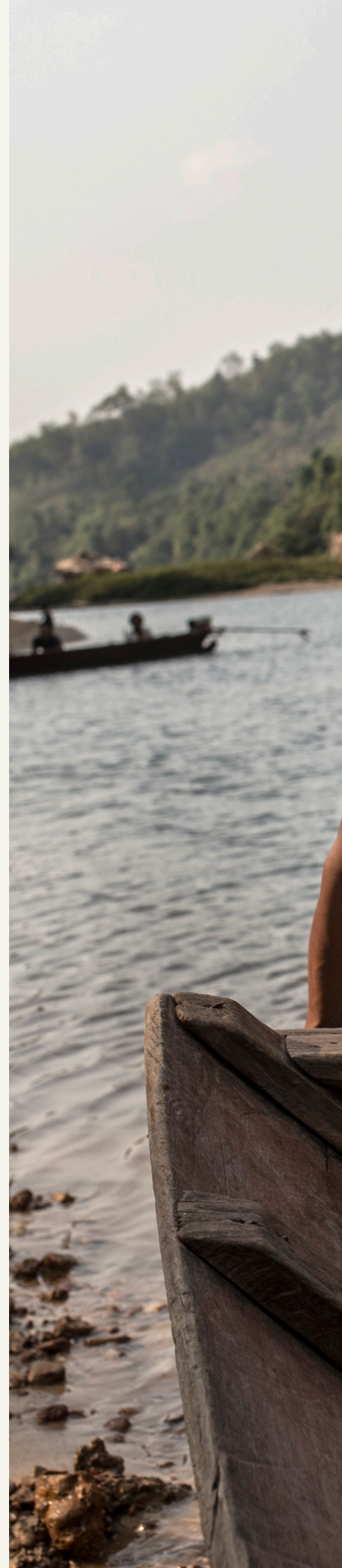
Some futures look good, some futures look bad. Some futures are good for a few, other futures are disastrous for the ecosystems that keep us alive and resilient.

WWF Myanmar undertook this process to better understand the drivers of change that help or hinder our progress towards an equitably beneficial future. By imagining the possible directions the future could take, we can imagine what sort of actions we need to take. This is to make sure we collectively follow the future that we want, and not the future that we do not want.

This report has been developed from the culmination of workshops in 2017 and 2018, collecting the perspectives of government, civil society, academia and business in the Ayeyarwady Basin, including the Delta, Middle Basin, Lower Basin and Chindwin Basin. 103 participants attended these workshops. They represented:

GOVERNMENT AGENCIES SPANNING SECTORS LIKE RURAL DEVELOPMENT FISHERY IRRIGATION URBAN MUNICIPALITIES INLAND WATER TRANSPORT ENVIRONMENTAL CONSERVATION DEPARTMENT (ECD) AGRICULTURE WATER RESOURCES UTILIZATION MARINE MINING ENERGY ACADEMICS WHO SPECIALISE IN GEOGRAPHY ELECTRICAL POWER ENGINEERING ECOLOGY CIVIL ENGINEERING ECONOMICS PRIVATE SECTOR REPRESENTATIVES TOURISM CONSTRUCTION FARMER MARKETS TRADE FISHERIES URBAN DEVELOPMENT RICE MILLING TEXTILES INDUSTRY SANDMINING CSOS REPRESENTING A BROAD RANGE OF INTERESTS SOCIAL ENVIRONMENTAL GOVERNANCE TRANSPARENCY & ACCOUNTABILITY RIGHT-BASED & YOUTH ORGANISATIONS

This is the second volume of a two-part series of reports highlighting perspectives of diverse stakeholder across the Ayeyarwady Basin. The first workshops were centred on creating a common understanding of the Ayeyarwady River Basin and the risks and opportunities associated with living in the basin. The second series of workshops were then focused on the future, and what the possible development pathways in the future may look like.





WHAT ARE THE DRIVERS OF CHANGE IN THE AYEYARWADY?

Imagine life in the Ayeyarwady Basin 40 years ago.
What is different?
What is the same today?

Discussing the changes that shaped the past and current challenges in the Basin helped to identify the main drivers of change for the future. There are many different drivers and directions – during the workshops, stakeholders identified what they thought was most important. These drivers became the building blocks for our future scenarios.

What is changing in the Ayeyarwady Basin? In the future, how will people live and thrive socially and economically? How does this impact the River and the ecosystems that depend on it?

POLITICAL

“Good government policy is an important driver of change. Good river basin management, good governance with laws and regulations being implemented.”

“Implementation is key. We have the laws already. This required political will.”

“Law enforcement and implementation. Agriculture, mining, fisheries, construction and industries. These are the key sectors.”

SOCIAL

“Poverty and illiteracy are the main drivers for our poor development.”

“There is little awareness on sustainable practises. People don’t realise the negative effects of their actions”

“Lifestyles and attitudes are changing as the living standard gets higher. This has negative impacts on the environment.”

LEGAL

The “Rule of Law” is not being followed. We need better health and safety laws. We also need better law enforcement in the gold mining sector. We also need better implementation of environmental conservation laws and regulations”

TECHNOLOGICAL

“Poor technology is causing challenges. In the future, technology will save us. We will invent new technologies for better navigation and more productive farming.”

ECONOMIC

“Illegal mining in the upstream stretches of the Ayeyarwady and Chindwin River Basins causes health issues for people and our biodiversity.”

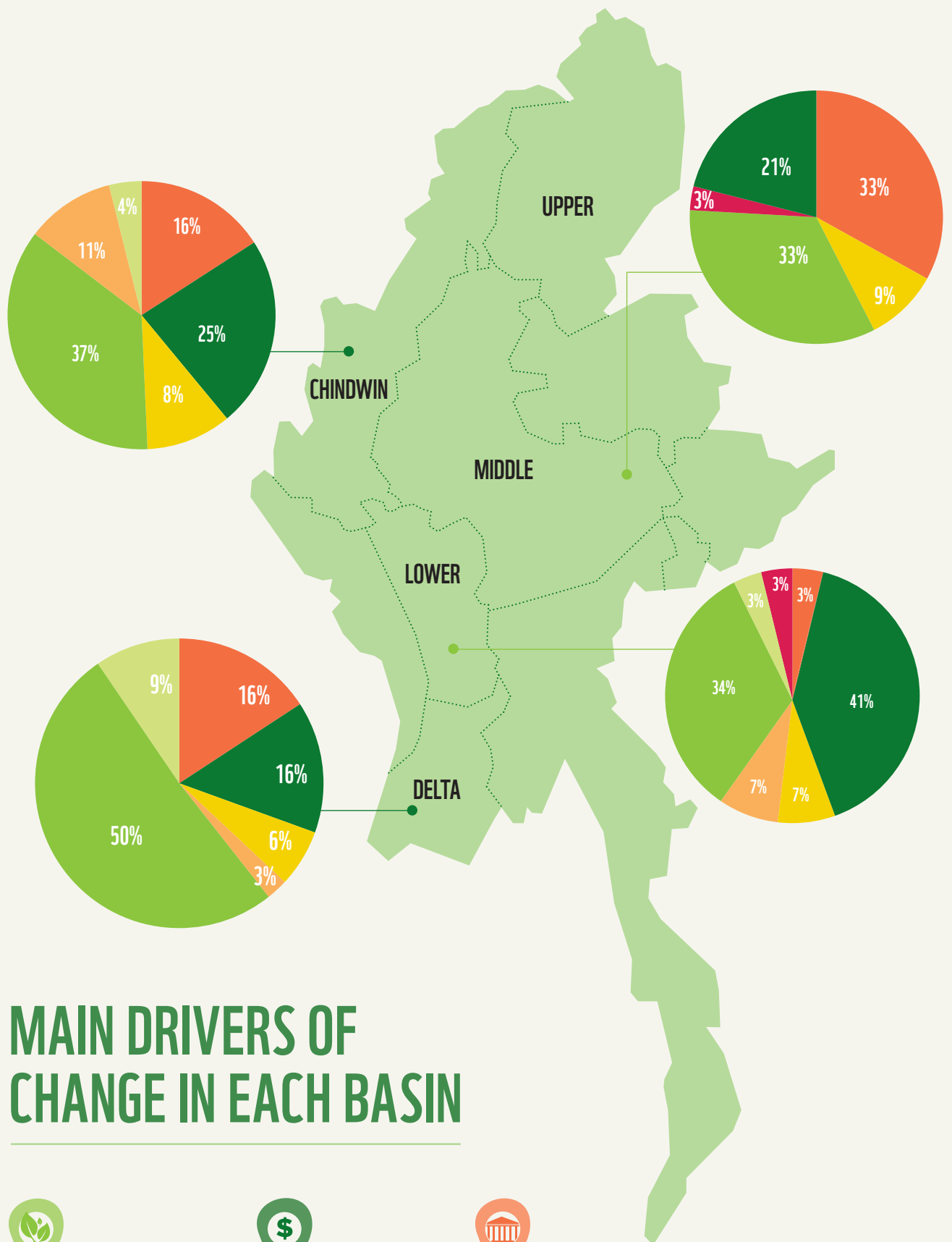
“Industries and business are polluting the river through their waste water. Solid waste and litter is also killing the river.”

“We need more budget allocations from central government to carry out our work.”

ENVIRONMENTAL

“Deforestation is causing erosion, which in turn is causing sedimentation. This is a problem for boats on the river and also causes flooding. With climate change, these problems will only get worse.”

“Deforestation will continue as long as there is poor access to electricity.”



MAIN DRIVERS OF CHANGE IN EACH BASIN



ENVIRONMENTAL IMPACT



ECONOMIC GROWTH



GOVERNMENT POLICY



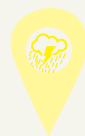
TECHNOLOGY



POVERTY



SOCIAL COMMUNITY



CLIMATE CHANGE



WHAT COULD THE FUTURE LOOK LIKE?

The drivers are distilled into two major categories, seen as the most important factors shaping the future of the Ayeyarwady Basin.

- 1) The nature and form of the economy and
- 2) the scale of governance

These drivers form the basis of the different scenarios. Neither of the axes are inherently good or bad, they are just used as the skeleton on which stakeholders in the basin could tell their future stories.





SCENARIO 1

CENTRALISED GOVERNMENT & LARGE SCALE ECONOMIES

The main theme of this possible future is a centralised form of government and governance that dictates how policies and legislation are designed, formed and implemented. This future also includes an economy that is focused on large-scale infrastructure and developments. For instance irrigation at scale, commercialisation and large industrial zones.

Out of all the possible plausible futures, the centralised government with large scale economies was voted the least likely by the participants.

SCENARIO 1

CENTRALISED GOVERNMENT & LARGE SCALE ECONOMIES

YEAR: 2030
NEWSPAPER HEADLINE:

**"HUGE SHIPS NAVIGATING
THE AYEYARWADY FOR THE FIRST
TIME IN YEARS"**

THE MIDDLE BASIN STORY

Central government makes a new water law and supporting laws and regulations for a port and other navigation improvements.

This promotes foreign investments, resulting in headlines that read "In summer, 8ft draft ships can navigate the Ayeyarwady."

However, because of uncontrolled economic growth, environmental impacts grow, destroying wetlands and biodiversity.

This impacts upon fishermen and farmers in the region, resulting in migration to cities for employment.

WHAT DOES THIS MEAN FOR THE RIVER?

In the Middle Basin, "the best water way" is a good future for navigation. And for other sectors that depend on river navigation for trade. **This future is a disaster however for the fish and farmlands**, and therefore also for the 70% of people who are employed through the agricultural sector (currently) in Myanmar. The end of the story speaks of better environmental provisions. But do we have to wait until 2040 to implement these?

YEAR: 2030
NEWSPAPER HEADLINE:

**"ANTI-MINING PROTESTS
CONTINUE"**

THE CHINDWIN BASIN STORY

Massive agricultural investments in rubber plantations, coffee fields and Myanmar sterculia gum farms. Because this is at an industrial scale, fertilizer use is significant. The mining sector is also heavily prioritised.

Deforestation is a negative outcome because of agricultural expansion. In terms of mining, law enforcement is very weak.

Pollution continues unabated. The river, is polluted and fish species are on the decline.

The system starts to collapse and GDP growth slows down.

People protest to stop mining, demanding EIA/SIA implementation. "Anti-mining protests continue, date: December 20, 2040"

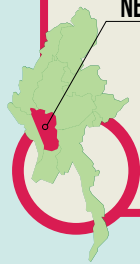
Government implements strict environmental regulations on wastewater treatment for all sectors.

WHAT DOES THIS MEAN FOR THE RIVER?

The Chindwin is especially at risk due to pollution from mining. Because this future talks about central government control and large scale investments, the voice of small-scale farmers and fishermen is not heard until the environmental system collapses, putting a large proportion of the livelihoods in the basin at risk. They feel helpless in fighting against the mining sector, and therefore felt that only when it was a last resort, would the issue be dealt with.

This is not a happy future for the Chindwin River. Large scale development of agricultural systems that pollute the environment are ultimately not sustainable.

**STOP
THE CHINDWIN DAM!**



YEAR: 2030
NEWSPAPER HEADLINE:

**"COLLAPSE IN FARMING AND FISHING
CAUSES MASS MIGRATION.
CITIES CANNOT COPE"**

THE LOWER BASIN STORY

In the lower basin, economic growth is centred upon the growth of sand mining to support the growing construction sector.

This results in more erosion, negatively impacting navigation. Government responds by taking a loan for navigation improvements.

The rush in construction results in infrastructure development that does not include wastewater treatment.

Water pollution kills fish and destroys agricultural land. The poor and farmers move to find work outside the region as migrant workers. "Farming and fishing collapse, leading to mass migration to cities that cannot cope."

Eventually, Centralized Government make strict environmental laws and regulations on agriculture, fisheries, and wastewater disposal and water resources.

They also put together strict regulations on sand mining to ensure that the river dynamics are kept to support livelihoods like fishing and farming.

WHAT DOES THIS MEAN FOR THE RIVER?

The lower basin is especially at risk due to the demand for construction sand from the river. This drives instability in the river bank, causing a number of unintended consequences for navigation and the fisheries sector. **A large drought shows how unprepared the region is for climatic shocks.**



YEAR: 2030
NEWSPAPER HEADLINE:

**"MYANMAR
WORLD'S NO. 1 RICE EXPORTER.
BUT AT WHAT COST?"**

THE DELTA STORY

Flooding impacts the region, destroying the agricultural sector.

The agricultural sector receives emergency funding, and invests in using modern technology, resulting in high productivity rates and manufacturing of value-added agri-products.

Central government establishes large-scale fish farms using incubator technology; and also improves the fish markets.

Government controls waste-water disposed from industries & farmlands into rivers to minimise pollution.

The Delta reduces the use of chemical fertilizers and pesticides as central government enforces laws in agriculture, resulting in good quality crops and fisheries for export.

Myanmar celebrates becoming the "No. 1 Rice Export Country in the World – at what environmental cost?"

WHAT DOES THIS MEAN FOR THE RIVER?

In the Delta, the future is heavily dependent on technological advances "saving" the agricultural and navigation sectors. **The river itself is not healthy, as uncontrolled pollution from agriculture and industry kill the fish.** This causes major challenges with displaced fishermen and farmers, dependent on the delta, looking for work in the towns and cities.





SCENARIO 2

LOCALISED GOVERNANCE & LARGE SCALE ECONOMIES

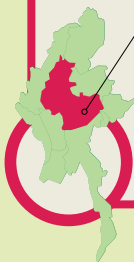
The main theme of this future is localised governance at a township or regional or state level. The economy however is centred upon large scale investments in agriculture, industry and energy provision. Environmental impacts are significant in the key growth nodes such as industrial zones or large-scale farming operations in each sub-basin.

SCENARIO 2

LOCALISED GOVERNANCE & LARGE SCALE ECONOMIES

YEAR: 2030
NEWSPAPER HEADLINE:

**"THE RESULTS ARE IN:
ECONOMY TRUMPS ECOLOGY"**



THE MIDDLE BASIN STORY

Storage dams are built to support large-scale irrigation. Agricultural development means more employment. Hydropower and solar plants are constructed to support off-grid solutions.

There are environmental problems such as water pollution, bank erosion and deforestation. Enforcement of national laws is weak.

Regional laws and shared management allows for more public services due to increased revenue collection at local scale.

Agricultural processing industries are founded by using food technology advancements and the stable power supply.

But farmers and factories use chemical fertilizers and pesticides, causing erosion and negative impacts on biodiversity.

The agricultural problems cannot be solved, affecting fisheries and livelihoods. As a result, this area is facing health problem due to poor access to protein (from limited fish supply) polluted drinking water.

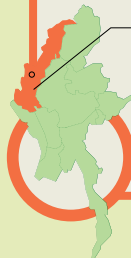


WHAT DOES THIS MEAN FOR THE RIVER?

In the Middle Basin, the proposed newspaper headline for this future was "2030: Agricultural production has doubled in 10 years". However, at what cost? Although irrigation increased, and infrastructure investments were large, **ultimately this story ends in poor nutrition resulting in negative health impacts for the people living in the basin.**

YEAR: 2030
NEWSPAPER HEADLINE:

**"MINING SECTOR GROWING
WHILST FISH NUMBERS PLUMMET"**



THE CHINDWIN BASIN STORY

Advanced large-scale farms producing export-quality crops, livestock and value-added products are made possible through major investments in irrigation dams and fertilizers.

Increased fertilizer use and dams destroy the fisheries sector.

Local government responds quickly to legislate and implement wastewater treatment laws & regulations, pesticide control and public awareness. All dams are required to have fish passages.

Nonetheless, the mining sector continues to pollute upstream. The successes for some (mining) are failures for others (fisheries).

Communities lobby the mining industry to implement EIA/SIA procedures decreed by local government.

MINING



FISHERIES

WHAT DOES THIS MEAN FOR THE RIVER?

In this Chindwin Basin future, one could deem it "too good to be true" in terms of economic growth and the ability of local government to implement rules and regulations.

However, even in this future, there are negative impacts upon the fisheries sector when dams are not constructed in a suitable manner. Furthermore, too much of a good thing, like expansion of agriculture can also be bad - in this instance for the river health, and the fish that live within it.

YEAR: 2030
NEWSPAPER HEADLINE:

**"UNEQUAL ECONOMIC
IMPROVEMENTS CAUSING SOCIAL
ISSUES AND SPIKE IN CRIME RATES"**

THE LOWER BASIN STORY

Regional policy, laws and regulations are developed on integrated farming, transit zone planning, pesticides, air pollution and solid waste.

The transit zones and subsequent increased tourism boost the economy.

Hydropower in the upstream areas and factories in Mandalay begin to impact lower basin of Ayeyarwady.

The large-scale farms and industries in lower basin begin impact on Delta. This is taken into account for regional planning.

Poor local communities are not incorporated adequately, which leads to social problems and crime due to the unequal economic improvements

The unrest enters the news, destroying the tourism sector.

The chemical fertilizers and pesticides used in the large-scale farming have negative impacts on the natural fish ponds.

WHAT DOES THIS MEAN FOR THE RIVER?

The key learning from this possible Lower Basin future, is that **large-scale investments in the economy need to ensure that they incorporate local community interests.** In addition, large-scale investments, when decided upon at regional scale, **need to ensure that they do not negatively impact upon up or downstream areas.**

YEAR: 2030
NEWSPAPER HEADLINE:

**"THE RISE AND FALL OF THE
DELTA: NEW INFRASTRUCTURE
DESTROYED BY CYCLONE"**

THE DELTA STORY

Roads and infrastructure are developed and large-scale housing projects are carried out.

Modern farming systems are implemented with the help of technical experts by doing research. The virgin lands are converted into farmland.

As a positive impact, the socio-economic status is significantly improved but there is an issue on land tenure.

Then the area faces a severe cyclone.

Tourism, industrial and agricultural sectors are severely affected by the cyclone. Tourist visits are reduced. In the agricultural sector, food security is impacted.

There is more sand extraction as the region tries to rebuild itself. Environmental problems are being faced; especially soil pollution, low nutrient levels in soil, loss of aquatic animal and water pollution due to fertilizers and pesticides in farmlands.

WHAT DOES THIS MEAN FOR THE RIVER?

The "rise and then fall" of the Delta in this story is especially pertinent following the rebuilding of the region following a cyclone in 2030. For the stakeholders in the delta, the control and regulation of sand mining was one of the foremost drivers of change in the region.

The balance of the delta is especially sensitive with regards to sediment, and **without a better understanding of these dynamics, the delta will remain extremely vulnerable.**



SCENARIO 3

LOCALISED GOVERNANCE & SMALL SCALE ECONOMIES

The main theme of this future is localised governance at a township or regional/state level. Small scale industries are deemed to be the main driver economically. Although small-scale, there are many individual entities in agriculture, industry and even small-scale hydropower development.

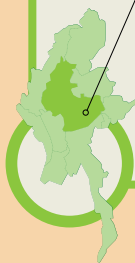
Environmental impacts are individually small, but cumulative impacts are significant across the entire basin. Interestingly, out of all the possible futures, this form of future was deemed the most preferable, as well as the most likely by the stakeholders.

SCENARIO 3

LOCALISED GOVERNANCE & SMALL SCALE ECONOMIES

YEAR: 2030
NEWSPAPER HEADLINE:

**"ORGANISATIONS URGED TO COME
TOGETHER TO SAVE THE AYEYARWADY"**



THE MIDDLE BASIN STORY

Regional government does not have the appropriate human resources and financial capacity to manage the new governance system.

Government cannot solve the water pollution issues.

Recognising this, the relevant government agencies, NGOs, CSOs, academics and local community work together to set up efficient wastewater treatment systems through stewardship and collective action.

Local government and third parties improve environmental monitoring mechanisms in an effort to protect their health and livelihoods.

Working collectively, community-based tourism gives a good image to the region. Eventually local government is able to implement better local policy and laws on water pollution.

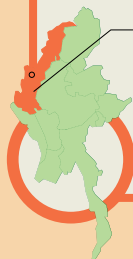
With a healthier river, the population of fish and Irrawaddy Dolphins begin to increase.

WHAT DOES THIS MEAN FOR THE RIVER?

Collective action and working together for a common future is the main theme of this scenario. Community-based tourism that values the role of a healthy functioning ecosystem helps to ensure that the Ayeyarwady remains clean of pollution and free-flowing.

YEAR: 2030
NEWSPAPER HEADLINE:

**"'GREEN ECONOMY' EMERGING IN
THE CHINDWIN BASIN"**



THE CHINDWIN BASIN STORY

Mining causes pollution of the river water making fish toxic and putting human health at risk.

Growth in urbanisation and industries results in pollution; both air and water, causing human health problems.

It is difficult to control the pollution issue.

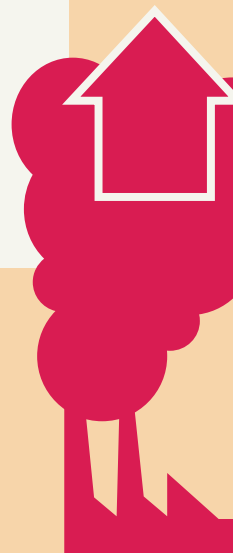
Regional Government makes laws and rules on pollution and improves law enforcement to safeguard human health.

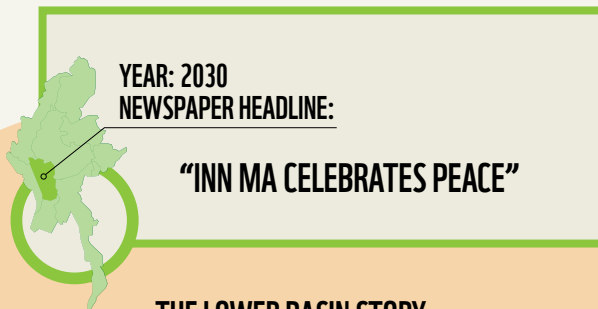
Eventually, local development is strong and healthy.

WHAT DOES THIS MEAN FOR THE RIVER?

The value of conservation areas in the Chindwin Basin is recognised in this future, where specific zones are set aside for different activities. For instance, conservation areas, critical for the sustenance of the fisheries sector are kept aside. Alternative sectors, such as value-added agriculture are grown in an effort to remove the reliance on the heavily polluting mining sector.

Although the river is not pristine, this seems to be a good "middle path" of development for the Chindwin River.





YEAR: 2030
NEWSPAPER HEADLINE:

"INN MA CELEBRATES PEACE"

THE LOWER BASIN STORY



Domestic small-scale inland fisheries are well developed in Myit Ma Kha Basin (Inn Ma).



However, fish diversity is lost because of commercialisation of aquaculture and illegal electric-shock fishing.

Local employment rises because of fish processing factories

Local government provides technical support to increase skilled workers through an incubator for technology.

This is used to rehabilitate the inland fisheries and also, for producing export-quality fishes.

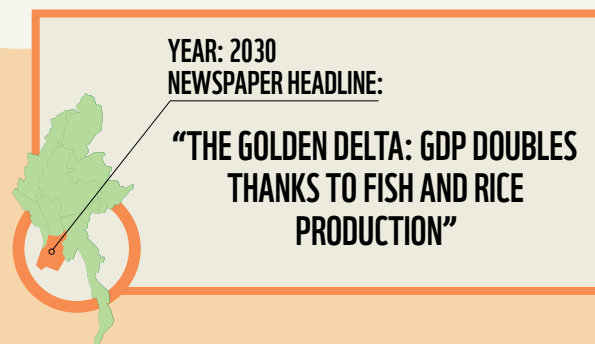
Revenue from the fisheries is allocated to the agriculture sector for progress towards better agriculture and a healthier environment.

Consequently, there are positives impacts: less crime, reduced public health problems, rehabilitated ecosystems, and conserved biodiversity.

Being a healthy environment develops tourism, bringing additional money to the area.

WHAT DOES THIS MEAN FOR THE RIVER?

The Lower Basin story recognises that to grow and develop the fisheries sector, there may be costs for other sectors such as agriculture initially. However, this future proposes using the growth of one sector to subsidise the sustainable development of another. Furthermore, **this story speaks about the positive impacts a healthy environment can be for other sources of income such as tourism.**



YEAR: 2030
NEWSPAPER HEADLINE:

"THE GOLDEN DELTA: GDP DOUBLES THANKS TO FISH AND RICE PRODUCTION"

THE DELTA STORY

There is high productivity rate and high income from farming and fishing; thus, an increase in GDP. "GDP doubles from rice and fish production in the Delta."

Small rice mills are built, and it creates local employment.



Overuse of chemical fertilizers and pesticides causes river pollution and soil damage. This is toxic to fish.

There are CO2 emissions due to many small rice mills contributing to air pollution.

Regional laws on pollution, both air and water are developed.

Biomass mini-power stations are founded for generation of electricity from rice mill husks. Pollution reduces.

Agricultural and fishery improvements reduce migration and ensure food security.

WHAT DOES THIS MEAN FOR THE RIVER?

In the Delta, **small scale farms and fisheries, together with their associated industries spell disaster for the Ayeyarwady River's health.** Regional laws on pollution, together with support both technically and financially are needed to ensure that the river is kept healthy while the economy and society continue to grow and develop.





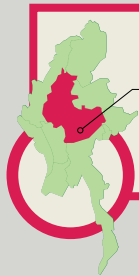
SCENARIO 4

CENTRALISED GOVERNMENT & SMALL SCALE ECONOMIES

The main theme of this future is centralised governance at national government level. However, small-scale businesses are deemed to be the main driver economically. Although small-scale, there are many individual entities in agriculture, industry and even small-scale hydropower development. This is similar to the current status quo in Myanmar, where 80% of businesses in the Ayeyarwady Basin are small-medium sized. Environmental impacts are individually small, but cumulative impacts are significant across the entire basin.

SCENARIO 4

CENTRALISED GOVERNMENT & SMALL SCALE ECONOMIES



YEAR: 2030
NEWSPAPER HEADLINE:

"IRRAWADDY DOLPHIN EXTINCT"

THE MIDDLE BASIN STORY

Central government supports farmers with subsidies. Farmers dig many tube-wells because water levels become very low.

Small-scale uncontrolled mining affects fish biodiversity and health negatively. Though central government implements strict licenses, there is continued illegal sand mining.

There is a tourist boat operation from Mandalay to Bagan because Bagan is a tourist site. This area has no dolphin because the river water is toxic from pollution and too much sediment.

Harvests are poor so farmers are forced to sell their lands to big commercial agricultural companies. Poor farmers migrate to the city for work. Additional urban migration causes chaos to health services.

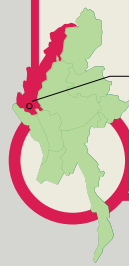
Sand mining licenses move further away into currently undisturbed areas, destroying the natural ecosystem and killing more dolphin habitat.

The tourism sector joins the fisheries and agricultural sector to lobby for healthy rivers to bring back the dolphin, fish and fertile soil.

It is too little, too late. The dolphins never return, and neither do the tourists.

WHAT DOES THIS MEAN FOR THE RIVER?

The Middle Basin has a number of competing sectors: navigation, sand mining, agriculture, tourism and industry. Each requires different ecosystem goods and services from the river, and each of them impacts upon the river in a way that is detrimental to other sectors. **Trade-offs are a reality for this region. In this future, the outcome is extinction of the Irrawaddy Dolphin.**



YEAR: 2030
NEWSPAPER HEADLINE:

"THE CHINDWIN RIVER IN EXCRUCIATING PAIN"

THE CHINDWIN BASIN STORY

There are many small mines; only 30 mines get official licenses but the reality is that there are 1000s of illegal mines.

Government cannot control the situation from its central position. Consequently, the river is polluted and it impacts on fisheries negatively.

There is poor access to electricity; this results in the further degradation of the Chindwin area because of deforestation and illegal mining.

Continued mining activities cause flooding, landslides, erosion, less rain and drought. It is bad for farmers. Agricultural productivity decreases because polluted water flows to farm fields; hence, farmers migrate to urban areas. Fishermen migrate to industries and the construction sector.

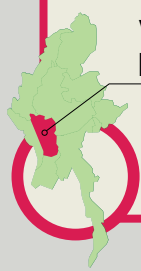
There are health impacts because fish is very expensive and only rice is eaten.

People in the catchment area make protests to government against the mining sector to change the policy and management system.

WHAT DOES THIS MEAN FOR THE RIVER?

This is not a good environmental future for the Chindwin Basin. The inability to stop pollution from the mining sector, compounded with large-scale degradation of the catchment due to deforestation results in negative outcomes such as migration to cities and towns for employment. Perhaps the conservation areas along the river are able to remedy the situation. But the key towards a better future is the lobbying together against sectors that are negatively impacting the basin health.

NO MORE MINING!!



YEAR: 2030
NEWSPAPER HEADLINE:

"ALL THE FISH ARE GONE!"

THE LOWER BASIN STORY

Sand mining is rife for construction in Yangon and Ayeyarwady region and export. Many small-scale sugar factories & distilleries pollute the river and also impact the fisheries.

Due to extreme amounts of sand mining, bank erosion and sedimentation the river morphology is changed, making it difficult for boat transportation. Hence truck use will increase.

Because of water pollution from the industrial sector and sediment problems, fish die. There is poor health of people because of a protein deficiency from fish inadequacy & pollution. There is also ecosystem damage.

Central government amends the law to Myanmar standards, and carries out stricter enforcement. This includes paying fines or closing down factories. The strict law may result in more unemployment as factories close.

This area has no fish, the river is essentially dead. Hopefully there is "new hope with the new law amendment"

WHAT DOES THIS MEAN FOR THE RIVER?

The Lower Basin is especially sensitive to sand mining for construction. The region is also dependent heavily on fisheries. Already pollution from industries is a challenge. Without enforcement of sand mining regulations together with industrial waste provisions, **the future of the fish is death.**



YEAR: 2030
NEWSPAPER HEADLINE:

**"FROM BAD TO BEAUTIFUL
IN THE DELTA"**

THE DELTA STORY

Rice productivity increases because government and NGOs support training on agri-tech.

Rice mills dispose of paddy-husks into the river and contribute to air pollution. There is river pollution due to chemical fertilizers and pesticides in agricultural lands. These activities impact on fishes and reduce fish production rate.

However, rice from the delta is exported to areas upstream, supporting good food security there.

Fishermen make protests against waste-water disposal into the river. They lobby government to improve policy.

Government identify special zones for fisheries & agriculture; and also makes a policy for tourism development.

Hotel zones are built; this causes more sand mining, resulting in changes in river flow patterns. There are less rice mills because government controls waste disposal with stricter regulation, thus, resulting in a higher price for rice, removing the small rice mills.


Central government also makes sand mining policy link to river system, resulting in a healthier river at the same time as navigation improvements.

WHAT DOES THIS MEAN FOR THE RIVER?

The delta needs to balance three sectors that currently are at war: rice, fisheries and sand mining. According to this story, this can be done through zonation of the different activities together with law enforcement. **We need management of all three of these sectors in an integral way, as individually they are not enough to ensure a resilient delta.**







**SO HOW DO WE CREATE A
SUSTAINABLE FUTURE FOR THE
AYEYARWADY?**

WHY DO WE CREATE FUTURES OF GLOOM AND DOOM FIRST, AND ONLY THEN ACT TO FIX IT?

A common thread throughout the stories: Why do we create futures of gloom and doom for the Ayeyarwady River first, and then only act to fix it? Why do we have to destroy ecosystem function, until we finally realise the benefits of natural capital to the economy and society of the basin.

Scenario planning provided some practical ideas how we can do things better, to improve the prospect of our future in the Basin. People living in basin proposed what we need to do for a sustainable future in Ayeyarwady the Basin. Three essential ingredients are needed:

BETTER INFORMATION

on the physical, social and economic dynamics in the basin to help inform

ADAPTABLE INSTITUTIONS,

both at a formal and informal level of a variety of scales to ensure that the river has a balanced amount of

GREEN AND GREY INFRASTRUCTURE

that is able to support a growing economy, developing society and healthy river ecosystem.

WWF IS COMMITTED TO SUPPORTING THESE ACTIVITIES IDENTIFIED IN THE BASIN TO ENSURE THAT WE LIVE IN THE FUTURE WHERE SOCIETY AND ECONOMY ARE ABLE TO DEVELOP WITHOUT DETRIMENT TO ONE OF THE LAST FREE-FLOWING RIVERS IN SOUTHEAST ASIA.

BETTER INFORMATION

Research to further improve understanding of our rivers

Use data to identify conservation priorities

Communicate the information collected on the value of the river within the country



INVESTIGATE FREE-FLOWING RIVERS, ENVIRONMENTAL FLOWS, FISHERIES MIGRATION, SEDIMENT DYNAMICS AND THE IRRAWADDY DOLPHIN

ADAPTABLE INSTITUTIONS

Organise bottom-up local committees or Water User Associations to communicate collectively with the government

Clarify and then communicate the basin management principles and regulatory rules



FACILITATE A WATER STEWARDSHIP WORKING GROUP TO BRING THE PRIVATE SECTOR TOGETHER AROUND WATER CHALLENGES

GREEN AND GREY INFRASTRUCTURE

Highlight the importance of both green and grey infrastructure

Identify conservation areas or reforestation to be linked with sediment dynamics and river training or dredging activities



EVALUATE NATURAL CAPITAL INCLUDING THE ROLES OF FORESTS (INCLUDING MANGROVES) IN REDUCING FLOODS

HOW WILL WWF CONTRIBUTE TO THE FUTURE WE WANT?



Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

<http://www.wwf.org.mm/en/>