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Bantay Kinaiyahan is a regular publication of the Interface Development Interventions, Inc. to provide the public with relevant and concise information on pressing watershed issues

Watershed Issues in Brief

WATERSHEDS and CLIMATE CHANGE :

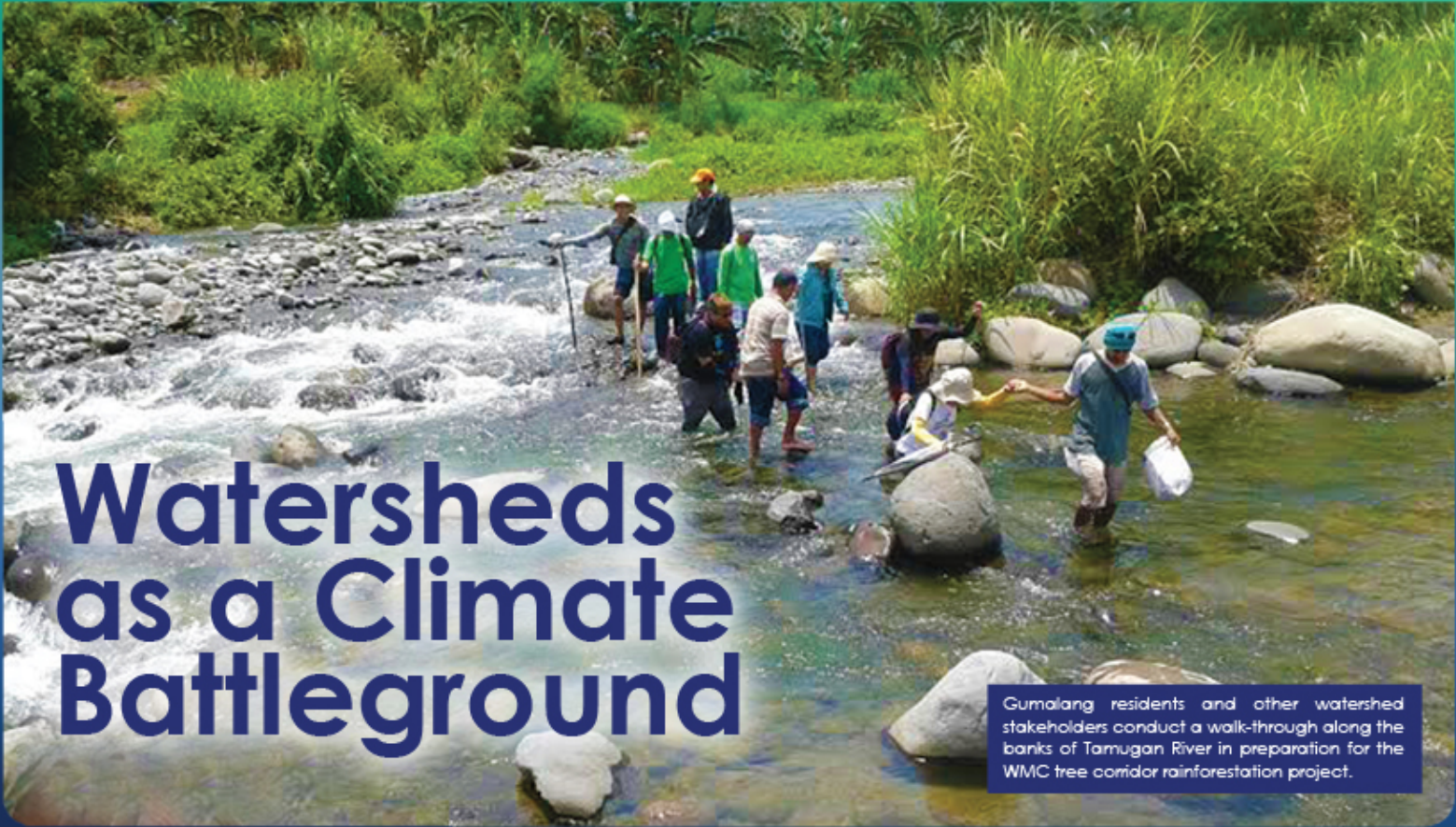
How integrated watershed management can mitigate the adverse effects of climate change?

At the 2nd Watershed Stakeholders Summit last May 2014, a participant asked panelist Dr. Lourdes Simpol, director of Ateneo de Davao University's Institute of Tropical Studies, why there was an equal emphasis on watersheds and climate change topics in the summit's agenda.

For the uninformed, it was a valid question, but as Dr. Simpol later answered, both issues are very important. *"When we talk about climate change and watersheds, these are not separate issues. These are interrelated and connected with each other."*, she emphasized.



Planting indigenous trees along riverbanks will restore the water cycle and rehabilitate rivers.



Watersheds as a Climate Battleground

Gumalang residents and other watershed stakeholders conduct a walk-through along the banks of Tamugan River in preparation for the WMC tree corridor reforestation project.

For the Interface Development Interventions (IDIS), the battle against climate change begins and ends at the watersheds.

"Climate change is essentially water change.", said IDIS Executive Director Ann Fuentes. *"It directly impacts our water resources, therefore our mitigation initiatives should focus on the sustainable management of our watersheds."*

Climate change is brought about by the increase in atmospheric carbon. Such increase, scientists point out, results in the "greenhouse effect" which will wreak havoc on the weather patterns, bringing about erratic and drastic changes in precipitation, volume and intensity of rainflow.

Climate change heightens the risks to watersheds and the urban populations living around them by causing unpredictable and extreme weather events, from heavy flooding and erosion to prolonged droughts.¹

"In a long dry season, for instance, the consumption for energy will increase as more people will use aircon and electric fans. In areas where power is generated from hydropower resources, this will mean erratic supplies of energy, impacting industries and utilities which depend on energy.", Fuentes said.

The Vulnerability and Adaptation Assessment recently carried out by the local government of Davao City in partnership with the United Nations-Habitat also highlighted the negative impact of climate change on local weather patterns. Using data from the World Wildlife Fund study "Business Risk Assessment and the Management of Climate Change Impacts", the VAA report said that "the inter-annual variability of monsoon rainfall in the Philippines is likely to increase."²

*"While some parts of the country are likely to be exposed to an upward trend in rainfall, other parts are likely to experience an intensification of drought associated with an unpredictable deficit in rainfall."*³ the report further said.

¹ *Managing Watersheds for Urban Resilience: A Policy Brief 2011 Partnership for Environment and Disaster Reduction (PEDRR)*

² *Vulnerability and Adaptation Assessment Report of Davao City 2014 United Nations Habitat*

³ *Ibid*

WATERSHED	AREA IN DAVAO CITY	NO. OF BARANGAYS
1. Davao River Watershed	121,385	91
2. Lasang River Watershed	29,132	8
3. Talomo River Watershed	21,578	26
4. Bunawan River Watershed	18,328	21
5. Tuganay River Watershed	18,120	2
6. Lipadas River Watershed	16,796	19
7. Sibulan River Watershed	10,782	5
8. Matina River Watershed	7,879	10
TOTAL	244,000	182

The Davao Watersheds



Source:
Davao City Planning
and Development Office



The Panigan-Tamugan Watershed, which is critically important as a future source of Davao's potable water, is a component of the bigger Davao River Watershed.

Did you know that?

Davao's watersheds are centers of endemism. This means that there is a high percentage of indigenous species of flora and fauna which live in the watersheds.

In 2013, IDIS commissioned the Philippine Eagle Foundation to conduct a wildlife survey of the Talomo-Lipadas and Panigan-Tamugan Watersheds. The researchers were able to document 171 vertebrate species, mostly endemic, which are living in the dipterocarp forests found in the lowland areas. 28 of these species are categorized as threatened and near threatened, according to the International Union for Conservation of Nature (IUCN). Two critically endangered tree species, the white miranti and the tanguile species, were also documented by the research team.

Source: Ybanez, Jayson, et. al (2013) *Resource and Socio-Economic Profile of the Talomo-Lipadas and Panigan-Tamugan Watersheds*. Interface Development Interventions, Inc.



Reforestation as a Key Strategy

An actual reforestation area at Mt. Tipolog.

Such scenario can be mitigated by ensuring that the watersheds have sufficient forest cover. More specifically, the right type of trees present in the watersheds can make or break a watershed's capacity to absorb rainfall.

Scientists from the Institute of Tropical Ecology at the Visayas State University found out that watershed rehabilitation using indigenous trees has a more beneficial impact on the local ecology and water cycle.

Dr. Pacienca Milan and her colleagues pioneered in using native tree species to reforest denuded landscapes and restore key ecosystem functions and services.

What is Reforestation?

It is a method of forest rehabilitation which uses indigenous/local trees to approximate the species composition and structure of the original rainforest.

According to their research, indigenous tree species which approximate the physical structure and species composition of a natural rainforest can protect biodiversity and maintain the water cycle in the watersheds.⁴

Results from their demonstration farms showed that not only were soil structure and water holding capacity restored, but the microclimate was also improved.⁵

4 Milan, Pacienca PhD and Margraf, Josef, Tropical Ecology Program, VISCA, Baybay Leyte. (1994). Reforestation Farming: An alternative to conventional concepts. *Annals of Tropical Research (ATR)*, Vol XVI

5 Milan, Pacienca PhD (2011). Reforestation: A Paradigm Shift in Forest Restoration in the Philippines for Sustainability and Climate Change Mitigation. [Powerpoint Presentation] Online. Available: <http://www.slideshare.net/eltisides/mindanao-course-reforestation-a-paradigm-shift-in-forest-restoration-in-the-philippines-for-sustainability-and-climate-change-mitigation-pacienca-p-milan>

Tree Corridors along Riverbanks

Erosion and lack of forest cover have reduced the water levels of Panigan River.

According to IDIS, rivers and streams are vulnerable to climate change because the warmer ambient temperatures can destroy the water ecosystem.

"Climate change can result in decreased stream and riverflows. If this happens in Panigan-Tamugan, our future generations will no longer have sufficient water supply.", Fuentes, pointed out.

Drastic increases in temperature often bring a shift in environmental conditions, often favoring the proliferation of pests which attack crops. Similarly, ecological processes such as nitrogen cycles and other key cycles are also disrupted.

"To counter this, we need to plant trees so that we can restore the natural ecosystems and biodiversity of the rivers.", she said.

Planting tree corridors along the river banks will also restore the natural range of water quality because the root systems will trap chemical residues and soil sediments.

It will also restore the flow regime and minimize surface run-off and soil erosion during heavy rains. At full growth, the trees will capture more carbon while improving the local micro-climate.⁶

"By planting these forest corridors or what is also known as vegetative riparian buffers, we can build the resilience of Davao's watersheds against the negative effects of climate change. When used as a disaster risk management strategy, we can minimize if not prevent the impact of floods in the lowlands where the population is concentrated.", Fuentes said.

In 2005, the United Nations assembled an international advisory committee to write a definitive report to evaluate the extent of the world's agricultural knowledge and technology in reducing hunger and poverty. The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) was launched as an intergovernmental process and endorsed by all United Nations development agencies. In 2008, it presented its report which highlighted, among other things, the important role that organic agriculture plays in climate change mitigation and adaptation.

"IAASTD recommended core organic management techniques for successful climate change mitigation and adaptation; including legumes in crop rotations, supporting low-input agriculture, applying water-conserving practices, promoting agro-biodiversity for increased resilience of agricultural systems and diversification of agriculture."^{*}

⁶ Interface Development Interventions. (2014) *Adopt a River bank Guidelines*. Internal document.

^{*}IAASTD. 2008. *Agriculture at a Crossroads. International Assessment of Agricultural Knowledge, Science and Technology for Development*. Island Press, Washington DC. www.agassessment.org

Resiliency of Indigenous Trees

Agro-forestry initiatives, instead of monocrop banana farming plots, help trap carbon emissions, mitigating the negative effects of climate change.

The Philippine Tropical Forest Conservation Foundation (PTFCF) also recommends the following native climate resistant trees for reforestation:

- Bagtikan (*Parashorea malaanonan*)
- Kalumpit (*Terminalia microcarpa*)
- Bitaog (*Calophyllum blancoi*)
- Bagalunga (*Melia dubia*)
- Molave (*Vitex parviflora*)
- Lingo-lingo (*Vitex turczaninowii*)

Practicing agroforestry can promote soil carbon sequestration while also improving agro-ecosystem function and resilience to extreme climatic changes by enhancing fertility and soil water retention.

This is because indigenous trees are more climate resilient than the exotic ones which are popularly grown in commercial nurseries. The Philippine Tropical Forest Conservation Foundation's Jose Andres Canivel, in fact said, that in contrast with exotic mahogany, gmelina and rubber, native trees like narra, dipterocarps and Philippine mahogany have higher resistance to pests and typhoons.⁷

Here in Davao City, the use of indigenous tree species for watershed reforestation programs has begun to take hold. IDIS, an environment group, is collaborating with the Watershed Management Council in implementing rainforestation projects along the riverbanks for the Panigan-Tamugan Watershed, the future site of the city's drinking water.

Boyd, et. al.. *Making Watersheds More Resilient to Climate Change Adaptation Response in the Grand River Watershed, Ontario, Canada.*

⁷ Ranada, P. (2014, Feb 21). *Is the government reforestation program planting the right trees?* Rappler Retrieved from <http://www.rappler.com/nation/51200-national-greening-program-native-trees>

Organic Farming in the Watersheds

Resiliency of Native Trees

Small scale women farmers like Nancy Killing Alibango help protect the watershed through their use of organic farming methods.

The type of farming practiced in the watersheds also has an important role in mitigating the impact of climate change.

Scientists have long acknowledged that conventional agriculture, which is dependent on pesticide use, is a major contributor to climate change. It is, in fact, “responsible for 15% of total greenhouse gas emissions worldwide, accounting for one quarter of carbon dioxide emissions, two-thirds of methane emissions and nearly all nitrous oxide emissions.”⁸ (Kotshchi and Muller-Samann, 2004).⁸

Organic agriculture, meanwhile, has been singled out because of its potential as a mitigating method against the effects of climate change. The United Nation's Food and Agriculture Organization (FAO) has sounded off on the value of organic agriculture in climate change mitigation and adaptation.

In a report released last 2003, FAO said that the soil carbon sequestration potential in higher in organic farming than in conventional agriculture. This is because the organic farming method of feeding soils annually with organic matter is the best way to increase soil organic carbon. This same method also limits its nitrous oxide emissions because natural organic fertilizers have less concentrated nitrates than synthetic ones. Another important point is that because organic farmers do not use energy-intensive synthetic chemicals, they avoid the fossil fuels used to make these products, thereby lessening carbon dioxide emission.⁹

All these enforce the reason why it is important to promote organic agriculture not only as food security strategy but also a climate mitigation strategy for Davao City.

8 Boron, S. (2006) *Building Resilience for an Unpredictable Future: How Organic Agriculture can help farmers adapt to climate change*. [PDF] United Nations Food and Agriculture Organization. Retrieved from: www.fao.org/3/a-ah617e.pdf

9 Ibid.

Interlinked, Intertwined

"Clearly, our watersheds are an important arena in Davao City's strategy on climate change mitigation.", Fuertes said. "Integrated sustainable watershed management (ISWM) should be at the core of the city's climate change adaptation and mitigation initiatives."

"By ISWM we mean the process of managing human activities and natural resources in an area defined by watershed boundaries. This approach allows us to protect important water resources, while at the same time addressing critical issues brought about by the current and future impacts of rapid population and economic growth and climate change."

She pointed out that the legislative policies to help address these issues are already in place. The Watershed Code, the Rainwater Harvesting and Organic Agriculture Ordinances are local laws that can facilitate mitigation initiatives.

"Our watersheds are very important; not only does it support our urban life and development but it also provides natural ecological services that can help mitigate, if not prevent, the adverse effects of climate change.", she said.

"Protecting the future of our watersheds will entail strategies to improve the watersheds capacity to cope with climactic shocks but the real challenge now for policymakers and citizens alike is how to balance this with competing multi-sectoral needs and lifestyle demands for watershed services." ■

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