



Module 1 - Trainers Guide

Green Economy General Principles

ENGLISH - PAPUA NEW GUINEA

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Cover photo: Mangroves in the Sea at Ovalau Island, Fiji. Source: Kristin Deason, GGGI.

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ABBREVIATIONS

GB	Green Business
GE	Green Economy
GGGI	Global Green Growth Institute
KOICA	Korea International Corporation Agency
LW	Learner's Workbook
Mts	Minutes
MW	Mega Watts
NGO	Non-Governmental Organization
PIDF	Pacific Islands Development Forum
PNG	Papua New Guinea
PNGDSP	Papua New Guinea Development Strategic Plan
RE	Renewable Sources of Energy
RO	Reverse Osmosis
SDG	Sustainable Development Goals
SIDS	Small Island Developing States
TG	Trainer's Guide
TOT	Training of Trainer
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America

Glossary

Blue Economy - is the sustainable use of ocean resources; for economic growth, improved livelihoods, and employment while preserving the health of ocean ecosystem.¹

Brown Economy - is one in which economic growth is largely dependent on environmentally destructive forms of activity, especially fossil fuels like; coal, oil, and gas.²

Climate Change - change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere. Thus, climate change may be a result of human activities that alter atmospheric composition, and also climate variability may be the result of natural causes.³

Emission - is the production and the discharge of something especially gas or radiation. But more often, it refers to gases being released into the air; like greenhouse gasses from power plants and factories, smoke from industries, transportation etc.⁴

Green Economy - an economy that addresses environmental risks and ecological scarcities, while aiming for sustainable development and eradicating poverty.⁵

Low Carbon Growth - is growth that causes or results in only a relatively small net release of carbon dioxide into the atmosphere.⁶

Soil Erosion - is the gradual process of movement and transport of the upper top layer of soil (topsoil) by agents such as water, wind, and mass movement.⁷

Sustainability - is the ability to be maintained at a certain rate or level or the avoidance of the depletion of natural resources to maintain an ecological balance.⁸

This “Green Economy General Principles” training module is an introduction to the fundamentals of Green Growth and Green Economy.

Upon completion of the course, the learners will achieve the following learning outcomes:

- Understand the three pillars of Sustainable development.
- Understand the difference between green, blue, and brown economy and positive outcomes of green/blue economy.
- Understand the green economy principles.
- Identify the natural resources in the community and discuss sustainable resource management.
- Identify tools that can help communities shift to green / blue economy.
- Discuss existing community structure and using it to change to green /blue economy.
- Identify organizations that can support or finance transition to green economy.

1 The World Bank, “What is the Blue Economy?”, <https://www.worldbank.org/en/news/infographic/2017/06/06/blue-economy>

2 The Green Market Oracle, “Environmental Implications of three types of Economies: Brown, Blue and Green”, <https://thegreenmarketoracle.com/2013/10/04/environmental-implications-of-three/>

3 IPCC Intergovernmental Panel on Climate Change, “Definition of terms used within the DCC pages”, https://www.ipcc-data.org/guidelines/pages/glossary/glossary_c.html

4 <https://www.google.com/search?q=emission+define&rlz=1C1GCEA>

5 UN Environment programme, “Green economy”, <https://www.unep.org/pt-br/node/23750>

6 <https://www.google.com/search?q=low+carbon+meaning&rlz=1C1GCEA>

7 Youmatter, “Soil erosion and Degradation: Simple definition, causes and consequences”, <https://youmatter.world/en/definition/soil-erosion-degradation-definition/>

8 Google search, “sustainability definition”, <https://www.google.com/search?q=sustainability+definition&rlz=1C1GCEA>

How to use this guide?

The trainer guide is provided with the class notes and includes activities which need to be done after each section of the course. The guide acts as a recommendation only. After seeing the situation on the ground in each community, the experienced trainers may use their judgment to modify their delivery and assessment techniques to achieve better results.

The Trainer Guide provides detailed notes written in the form that can be directly delivered to the learners. However, the very detailed notes are intended to broaden the knowledge of the learner as well. You are not required to read each paragraph from the Trainer Guide, but you are expected to know the materials sufficiently to train others. Firstly, you must know what key concepts the learners need to learn. These are normally called learning outcomes. The learning outcomes are all listed at the start of the Trainer Guide, and you must ensure that at minimum, every learner achieves those 7 learning outcomes. You are required to take at least a week to go over the TG and go through the activities in the Learner Workbook. During the actual training you can refer to the Trainer Guide and explain it to the learners in your own words. If you are unsure of something always refer to the TG notes. Also note to take heed of the time recommended for each session and activity.

In case where learner literacy levels are low, trainers are advised to adapt to the situations and modify activities as appropriate. It is advisable to keep a continuous record of competencies of learners. All competencies are achieved when learners fulfil all learning outcomes.

Conducting Activities

- Activities are best done in groups or pairs. It is recommended that in each group there is at least one who is more literate or a more active learner who can help to translate and explain the training contents to learners who are slower to understand.
- You may divide the learners into groups of at least 2 and preferably 3-4 learners and ask them to carry out a rigorous discussion within the group. Some activities can be given to the groups for overnight preparation. The trainer needs to be aware of the dynamics of relationships in the community when dividing learners into groups. Sometimes women and youth are not free to share their views when the men from the communities are present. The trainer should ideally ask learners for their guidance when organising them into groups for discussions.

- Ideally the learners may present the results of their activities to the class and have a class discussion based on their findings.
- It is not necessary that all groups present in the same activity.
- However, it is important that all groups are given opportunity to present or verbally discuss their answers.
- At all times, encourage learners to be interactive and participative in class.
- Learners must be encouraged to be vocal and to contribute actively in class discussions.
- To better improve learning, the learners must be encouraged to strongly inquire about the topics through questions.
- The activities allow trainers to observe if the learners have achieved the learning outcomes. If possible, do keep record of the learner's achievement of learning outcomes so that you can help them learn better. A sample record table is given in this guide.
- Adapt existing activities and/or alternative suitable activities in case the desired literacy levels of learners are not met or the desired resources are not available.

Teaching Tool

The following tools/items may be required to enhance learner learning:

- Laptop/ computer and projector to play videos or present notes to the whole class. This will depend on availability. In case this is not available, you are recommended to take large prints of the key concepts and display to the learners while teaching.
- Provide each learner with pen or pencil, and paper to allow them to participate.
- Whiteboard and markers or black board and chalk can be made available to allow both facilitator and learner to state a point.
- The Learner Progress Record sample given below can be used to observe learners, note their feedback, and assess if they have achieved the specific learning outcome. This recording is useful for both the learner and trainer so you can focus on those who are falling behind. Note there are no marks to be awarded and the record is only to improve learning. This is entirely optional.

TABLE 1: Participant Progress Record – optional for trainers to use

Participant Progress Record (Optional)		Date:
Trainer's Name:		
Learner Name:		
Participant Outcome	Achieved Outcome (Yes or No) and Comments	
1. Understand the three pillars of Sustainable development		
2. Understand the difference between green, blue, and brown economy and positive outcomes of green/blue economy.		
3. Understand the green economy principles.		
4. Identify the natural resources in the community and discuss sustainable resource management.		
5. Identify tools that can help communities shift to green/blue economy		
6. Discuss existing community structure and using it to change to green/blue economy.		
7. Identify organizations that can support or finance transition to green economy.		

LESSON PLAN AND TIMES

TABLE 2: Lesson Plan and recommended timing of each session

Chapter	Lesson Type	Recommended Time (mts)
Inaugural Session		30
1. Ice Breaker - Introductions	Theory and activity 1	15
2. Environmental Challenges and Sustainable Development	Theory	40
	Activity 2	20
3. Green Economy Basics	Theory	60
	Activity 3	20
4. Shifting to a Green/ Blue Economy	Theory optional	30
	Activity 4	10
5. Natural Resources and Community Resource Management	Theory	60
	Activity 5	20
6. Conclusion	Theory	30
	Roleplays	20

A large, white, stylized number '1' is positioned on the left side of the page. The background is a teal gradient that transitions from a lighter blue on the left to a darker teal on the right. The number '1' is composed of a thick vertical stroke and a shorter horizontal stroke at the top, with a small gap between them.

Ice Breaker Introduction

Trainers must understand that the learners who are attending the module have taken time from their usual daily activities which sustains their livelihood. Most will also be very nervous and unclear regarding what the module is all about. Hence the trainer must ensure that the learners are comfortable and not too nervous. It is important to make them feel at ease so that they can focus on the module and absorb as much knowledge as possible.

Tell them that this is an informative module and there will be no tests or marks in this. You must inform them that this

module is being run so that they can take the information to help themselves to transition to renewable energy. Even if they do not use it, they can always use the knowledge to help others. In any way this module will better equip them to help grow their communities. Tell them to be at ease and focus on enjoying the day and asking as many questions as they want. Also tell them to not worry too much about complicated things as you will guide them through this.

ACTIVITY 1

Introduce yourself briefly to the learners. Ask if they are all comfortable at the venue. One by one ask them their names and tell them to give some details about themselves – such as what they would normally be doing at that time and what they hope to gain from the module at the end of the day. In addition if time permits – ask them what they think about Green Economy. There is no correct answer, and the goal of this activity is simply to get them relaxed and engaged into

the session. You may crack few light jokes as laughter always lightens the mood and helps learners relax. Ask the learners about their prior experiences in green economy and how much they know about the topic. Also ask them what they wish to gain from this training session and record their answers on paper so that it helps the trainer in setting a direction to the course. This input will help the trainer direct the training to the learners needs.

2

Environmental Challenges and Sustainable Development

2.1 Brown Economy

With vast ocean resources, dense forests, rich natural resources and considered as an exotic tropical paradise for tourists, PNG has one of the fastest developing economy in the Pacific. The pursuit for economic growth is a high priority of governments, private sectors, and elements of the civil society as they depend on it for financial support and stability.⁹ However, as a small island developing state (SID), PNG struggles with challenges associated with the increase in population growth, increase in demand for resources and geopolitical and economic interests.

A brown economy is economic growth that is largely dependent on environmentally destructive activities, especially through the use of fossil fuels like coal, oil, and gas.² This also includes the unsustainable extraction of natural resources.

FIGURE 1: Brown Economy¹⁰



This is evident in the production and development processes of a brown economy as they are unsustainable often resulting in the:

- Destruction of biodiversity through illegal logging and modern agricultural production.
- Use of non- renewable energy for manufacturing of products, resulting in increase in greenhouse gas emissions.
- Generation of harmful solid waste through mining and industrial activities.
- Overexploitation of fisheries, etc.

These are some of the many activities that add to increase levels of Climate Change.

These are some of the many activities that add to massive levels of Climate Change.

FIGURE 2: OK Tedi Gold Mine, PNG¹¹



Mining operations and disposal is seen to be a major source of environmental degradation in developing countries. Mining results in processes such as vegetation removal, improper disposal of wastes, landslides, earthquakes, flooding due to mine waters, etc.

FIGURE 3: Emissions from Industrial activities¹²



Emissions from the operation of Machineries and chemical processes also contribute to an increase in the effects of climate change.

⁹ Adapted from, A commentary on UNEP's Green Economy Scenarios, <https://doi.org/10.1016/j.ecolecon.2012.02.028>

¹⁰ From Brown to Green Economy, <https://www.lemauricien.com/le-mauricien/brown-green-economy-call-conventionalists-1/89489/>

¹¹ Picture adopted from OK Tedi Mining official Page. <https://oktedi.com/>

¹² Photo credit: Mohammed Tazil

TABLE 3: Mining Practices - Good and Bad

Bad Practice	Recommended Good Practice
Trees are being cut before starting a mine	To plant trees twice the number of trees.
Uncontrolled digging of over burden and disposal	Controlled Digging and disposal of over burden. Over burden is the topsoil which must be dug for reaching gold, bauxite etc. below.
Dust Generation in Mining and mining related transport	Dust Control Measures (use of foam, water) and covered transport.
Not following guidelines	PNG has regulations for quarry and mining set by the government. Stake holders are to ensure these are followed.
In actual practice there are no Risk Management and Emergency Preparedness plans	To strictly adhere to the regulations and to practice the relevant guidelines set by the PNG government.

The above may not be very relevant to the community but will act as a guideline should the industrial activities pick up in the communities in future.

2.2 Climate Change

Climate change is the change of climate which is associated directly or indirectly to human induced activities. It may be a result of human activities or natural causes, that alter atmospheric composition, and climate variability.³ Rapid industrialization and fossil fuel consumption which are activities of a brown economy, result in the continued exploitation of natural resources (forest/water/fossil fuels/) thus affecting the climate.

The use of chlorofluorocarbons (CFCs), used as coolants in refrigerators and air conditioners, aerosol sprays and industrial cleaning solvents contain compounds that result in the depletion of the ozone layer, which further leads to global cooling and greenhouse warming.¹³ Global warming further results in natural climatic events such as heatwaves, droughts, floods, cyclones, sea level rise and coastal inundation.

Figure 5 shows the impacts of coastal erosion. The continuous rise in sea level and wave strength is causing a continuous wash away of the Yule Island coastlines due to wave action.

Climate change poses threats to the social and economic wellbeing of Papua New Guineans, and others of vulnerable small island developing states (SIDs). As people of the Pacific,

FIGURE 4: Damages caused by 7.5 magnitude earthquake, Hela Province, PNG¹⁴



FIGURE 5: Coastline erosion on Yule Island, Central Province, PNG¹⁵



¹³ John T Hardy, Climate Change, Causes, Effects and Solutions, 2003, https://books.google.com/fi/books?id=QjQboHi6hNQC&dq=climate+change+causes&lr=&source=gb&navlinks_s

¹⁴ "Four confirmed dead after weekend quake in PNG", Radio New Zealand, 9 April 2018, Retrieved 9 April 2018. <https://www.rnz.co.nz/international/pacific-news/354542/four-confirmed-dead-after-weekend-quake-in-png>

¹⁵ Photo Credit: Benjamin Keni.

we depend on our natural environment and its resources for sustaining our needs for daily livelihood. From it, we are provided supplies of water, forest, marine and freshwater products, productive agriculture, and many more that ensures our health and survival. However, our method of consumption is such that we forget that our welfare links to the health of the planet.

Although, we need industrial and agricultural activity and development for economic growth, we are to ensure that measures taken, are sustainable. We, as humans have an interdependent relationship with the environment and its resources, thus we play an important role in the protection and the sustainable use of our environment.

The following guidelines lists some ways of reducing the effects of climate change:

- Avoid unnecessary cutting of trees (Deforestation). Although, trees are a major source of timber and firewood that are essential for making furniture and fuel, there are alternative and more sustainable measures to meet these needs. Fuel needs could be met using shrubs and dry leaves. Although it is easy to harvest trees, it is imperative to understand that the challenge lies in at least planting two of them after cutting one and taking care of it. It is easy to plant a tree, but a concerted effort is required to take care of them. This includes watering, applying organic fertilizer, preventing others from cutting it and many more. There are some fast-growing trees (e.g., bamboo) which can be planted for biofuel, however, this is 'easier said than done' and requires more awareness, to achieve this.
- When you use forest land for agriculture, remember to plant trees in the outer side of the field border as this avoids soil erosion and landslides if you are in a valley.
- Avoid over exploitation of water sources (ground water, river, springs).
- Avoid contaminating water resources (throwing waste and plastics, discharging chemicals into the river).
- Preserve and plant mangroves and corals.
- Practice responsible fishing and aquaculture (sea and freshwater).
- Preservation and responsible use of forests.
- Identify places vulnerable to flooding and do not allow people to stay in flood prone areas.
- Take measures to prevent sea erosion by planting mangroves, coral reefs, etc.

2.3 Global and National Strategies

The Paris Agreement 2015 is the first global accord on climate change that contains policy obligations for all countries.¹⁶ It sets out a global framework to reduce the emission of gases that contribute to global warming, pursuing efforts to limit it to 1.5°C.

The PNG government been a member to the Paris Agreement has taken a whole government approach in which it developed the National Development Strategic Plan 2010-2030 (PNGDSP). The plan aims to promote Sustainable development emphasizing the importance of integral human development, equality and participation, National sovereignty, and self-reliance, promoting security and international relations, Natural resources, and environmental sustainability for achieving green growth and combating the effects of climate change at the same time creating wealth¹⁷. The plan provides in general an overview of development planning in PNG going inline to also achieving PNG's vision 2050.

The 20 years PNGDSP is aligned to the Paris Agreement on Climate Change and the Country's Vision 2050. PNG's Vision 2050 is a 50-year pathway to decarbonize the PNG economy promoting sustainable development aiming for a Prosperous society by year 2050. Nationally Determined Contributions are at the center of the Paris Agreement and the achievement of the long-term climate goals there-in. PNG submitted its first intended nationally determined contributions (INDC) to the UNFCCC Secretariat on 30th September 2015 and was one of the first Pacific Island Countries to get theirs endorsed in March 2016.¹⁸ PNG though a country with both very low emissions and relatively low per capita emissions, it's National Determined Contributions (NDC) for the period 2015-2030 with short, mid, and long-term strategies to implement the SDGs in PNG include¹⁹

- Reduce 30 percent BAU CO₂ from energy sector by 2030.
- 100% renewable energy and grid connection by 2030.
- 10% CO₂ emissions through energy efficiency measures by 2030.

These plans and commitments underwent national consultation, included all stakeholders, and reflects the government's commitment to meet sustainable development goals.

16 Adapted from The Paris Agreement on Climate Change, Behind Closed Doors, https://doi.org/10.1162/GLEP_a_00361

17 Mumu, E., Taiyabu, W., Fairhead, L. and Levantis, T. (2012), "PNG's emissions path under the PNG development: strategic plan 2010-2030", Management of Environmental Quality, Vol. 23 No. 3, pp. 246-253, <https://doi.org/10.1108/14777831211217440>

18 Amali Shaw. (2015), Nationally Determine Contributions (NDC)-Papua New Guinea (PNG), Port Moresby, Government of Papua New Guinea. Available at <http://prdrse4all.spc.int/node/4/content/nationally-determined-contribution-ndc-papua-new-guinea-png> (19/07/2021).

19 Amali Shaw. (2015), Nationally Determine Contributions (NDC)-Papua New Guinea (PNG), Port Moresby, Government of Papua New Guinea. Available at <http://prdrse4all.spc.int/node/4/content/nationally-determined-contribution-ndc-papua-new-guinea-png> (19/07/2021).

2.4 Sustainability and Sustainable Development Goals (SDGs)

Sustainable development (SD) is development that meets the needs of the present generations without compromising the ability of the future generations to meet their own needs.²⁰

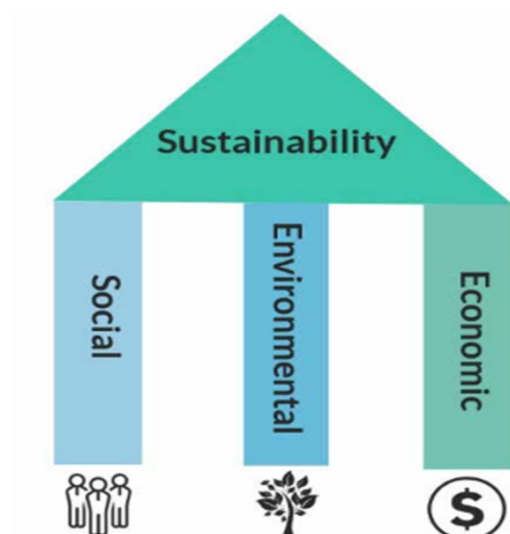
The Sustainable Development Goals (SDGs) for 2015 to 2030 was adopted through 'Transforming our world: the 2030.

Agenda for Sustainable Development', and represents the world's inclusive strategy for social inclusion, environmental sustainability, and economic development. Globally there has been emphasis for development through these SDGs which call for actions to end poverty, protect the planet and to live in peace and prosperity. These are expected to be implemented by 2030. Based on these, measures have been initiated by many countries including PNG to implement the SDGs. There are 17 SDGs as given in Figure 6.

FIGURE 6: The 17 Sustainable Development Goals²¹



FIGURE 7: Sustainability Pillars²²



Out of the above the goals relevant to these modules are:

- 6 - Clean Water and Sanitation
- 7 - Affordable and Clean Energy
- 8 - Decent work and Economic Growth
- 10 - Reduce in equalities
- 12 - Responsible Consumption and Production
- 13 - Climate Action
- 14 - Life Below Water
- 15 - Life on Land

Figure 7: Sustainability Pillars shows the three pillars of SD which are important for developing green policies for the economy. These include the social (people), environmental (planet) and economic (money or profit) pillars.²³ The function of the SDGs is to maintain stability among the economic, social, and environmental aspects to promote a sustainable future.

²⁰ Gro Harlem Brundtland, *Our Common Future: Report of the World Commission on Environment and Development* (Oxford University, 1987), <http://www.un-documents.net/our-common-future.pdf>.

²¹ Adapted from: <https://impakter.com/how-the-sustainable-development-goals-provide-a-framework-for-impact-minded-businesses/>

²² Graphics by Margaret Seruvatu, GGGI.

²³ Adapted from "Aligning the Criteria of Green Economy (GE) and Sustainable Development Goals (SDGs) to Implement Sustainable Development, August 2019, <https://www.mdpi.com/2071-1050/11/17/4615>

The following goals have been categorized based on the three pillars of Sustainability, which include:

FIGURE 8: Sustainable Goals divided into the 3 pillars²⁴



ACTIVITY 2

Target Group: Local government officials, Provincial Councils, District Councils, Town Councils, Island Councils, etc.

1. What are the sustainable goals you would like to address in Green Economy:

Water and sanitation, Affordable clean energy, decent work economic growth.

2. How would you address the issues concerning the three pillars of sustainability?

Will ensure government policies are addressed and implemented to provide work leading to economic development and take steps to ensure preservation of environment. Both these activities ensure quality of life for people.

3. What is climate change and how is it harmful?

Climate change refers to any significant change in the issues of climate (temperature, sunshine hours, change in rainfall patterns, etc.) lasting for an extended period. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer. This is relevant to us, as uncontrolled or over exploitation of natural resources warms up the planet resulting in climate change issues. E.g.: Rising sea level due to ice melting in the arctic.

The relevant activities to the community are destroying forests, smoke from cooking and waste burning, land fill of waste, uncontrolled fishing, dust.

4. What are some Sustainability measures that the community can take to reduce the effect of climate change?

- Energy – turn to use more renewable energy sources (solar, hydro, biomass, etc).
- Water – Ensure water is clean and treated for drinking or household use.
- Waste Management – Proper disposal of waste.
- Personal Hygiene – General Cleanliness.

Target Group: Traditional community/religious leaders, women, youth and vulnerable groups (single mothers, elderly).

1. Which of these is not a sustainable Development Goal?

- Clean Water and Sanitation
 - Clean Dressing/clothes
 - Affordable and Clean Energy
 - Decent work and economic Growth
- Answer b

²⁴ Adapted from "A Novel ICT Framework for Sustainable Development Goals", <https://doi.org/10.3390/su11071961>

2. What are the three pillars of Sustainability?

- People – important for developing right attitude
- Environment- Preserve and initiate measures for Greening
- Economic- Important for to implement green measures and growth.

3. What is climate change and how is it harmful?

Climate change refers to any significant change in the issues of climate (temperature, floods, landslides) lasting for an extended period. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

The relevant activities to the community are destroying forests, smoke from cooking and waste burning, land fill of waste, uncontrolled fishing, dust.

Target Group: Local electricians, people with technical aptitude, etc. Understand the technicalities to work on green jobs.

1. Name some sustainable development goal:

Clean energy, clean water, decent work all the year round

2. What do you understand about climate change and how is it harmful?

Climate change refers to changes in temperature, rainfall pattern, wind pattern over a period of time. This triggers to unseasonal rainfall, cyclones, flooding, droughts and other natural disasters.

3. Give some examples of waste recycling.

- Making Paper from Banana Waste
- Composting agricultural waste, vegetable Waste
- Recycling used coke cans

Target Group: Small businesses.

1. What are some sustainable development goals and how are they important to developing your business?

The sustainable development goals are clean water and sanitation, decent work, affordable and clean energy. All these help small businesses to market green products and helps in preserving and protecting the environment.

2. How do the three pillars of sustainability help you develop green business?

The basic reason is **economic**. Any business activity is profit oriented. The green economy helps in manufacturing, sourcing, marketing, and servicing green products. This helps people by developing jobs making money available for development. The green economy concept preserves the **environment**.

3. How do you link sustainability pillars and green economy principles?

The sustainability pillars are social (linked to wellbeing), environmental (linked to planetary boundaries) and economic (linked to efficiency and sufficiency) of green economy principles.

4. How does your business address climate change?

Use of clean energy in business, controlled use of water and waste management, scientific forest management will address issues related to climate change.

3

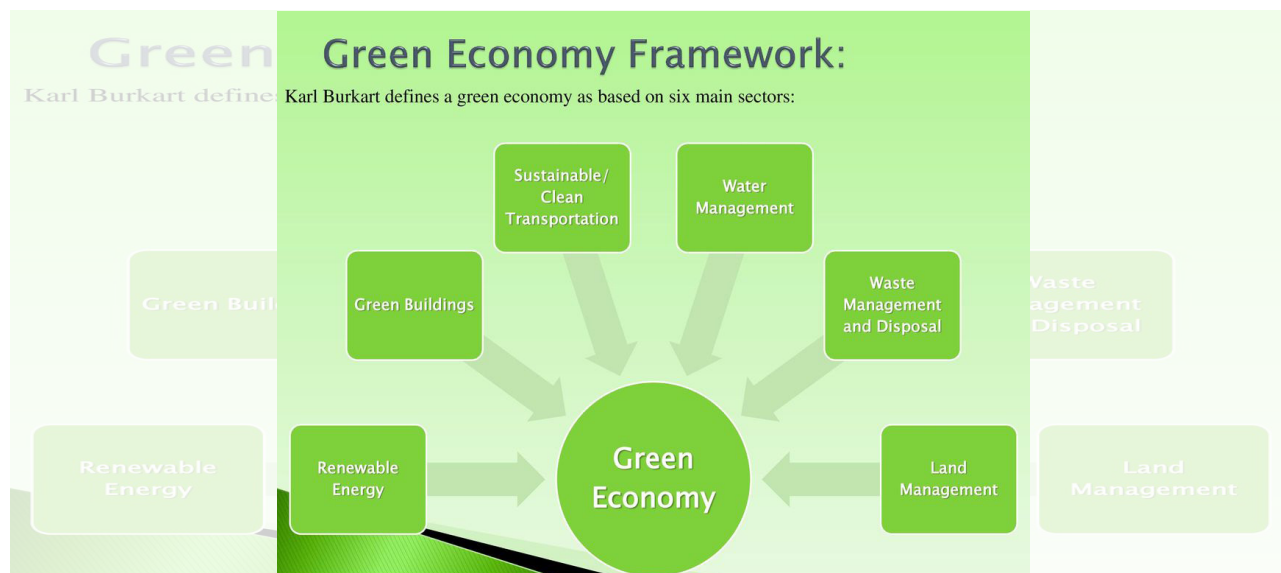
Green Economy Basics

3.1 Green Economy (GE)

A Green economy is an economy that addresses environmental risks and ecological scarcities, while aiming for sustainable development and eradicating poverty. It is an economy that emphasizes the need for businesses, policy, and decision makers to invest in the environment and is expected to address

the issues raised in a brown economy. It is a tool to promote and achieve sustainable development, eradicate poverty, and maintain the healthy functioning of the Earth's ecosystems. The GE framework aims to deliver more resource efficient, lower carbon, less environmentally damaging, more socially inclusive societies.²⁵

FIGURE 9: Green Economy Framework²⁶



Green Economy attempts to put in place low carbon growth-oriented systems / processes. Some examples that may be relevant and practiced by the community include:

- Use of solar and other forms of renewable sources of energy.
- Segregation of waste and proper waste disposal.
- Use of bicycles instead of motor bikes or vehicles for that matter.
- Planting trees and preserving forests and avoiding deforestation, etc.

All these will make the natural resources last longer and will improve community resilience and sustainability of the planet.

3.2 Blue Economy

The ocean continues to support lives by generating oxygen, absorbing carbon dioxide, recycling nutrients, and regulating global climate and temperature. The ocean supports our population with food and livelihood and is a mean of transportation. People in small island developing states such as the Pacific islands, depend on marine resources to meet and support their daily needs.

Despite this, many natural resources found in marine environments have been degraded by unsustainable use and practices. This is due to mining activities, fishing boats and vessels that discharge wastes into waters, oil spillages, discharge of cargo residues, exhaust from engines etc.

Moreover, coastal developments for tourism have led to the overexploitation of land and sea resources. Their associated impacts include sedimentation, eutrophication, and pollution among others.

²⁵ ResearchGate, "The global green economy: a review of concepts, definitions, measurement methodologies and their interactions", January 2017, <http://dx.doi.org/10.1002/geo2.36>

²⁶ Ayub Ali, "Green industry towards green economy in the rmg", 28 October 2015, <https://www.slideshare.net/ayubjueco/green-industry-towards-green-economy-in-the-rmg-54471169>

²⁷ Adapted from Our Oceans and The Blue Economy: Opportunities and Challenges, <https://doi.org/10.1016/j.proeng.2017.08.109>.

FIGURE 10: Ramu Nickel mine spill caused waters near the Nickel plant to turn bright red²⁸



The figure above shows coastal and sea water pollution caused by Nickel mine slurry spillage in the Madang Province of Papua New Guinea in 2019. The spillage has caused massive damages to the marine ecosystem that affected my lives leading to a public outcry and the eventual halt in the mine operations giving time for the environment to recover at the same time specialists were engaged by the government to look into the situation and help locals recover from the massive devastation.

Water related sports have seen a phenomenal rise in the last few years. Such activities have resulted in beaches often being used for the disposal of various types of waste (plastics, food wastes, cigarette butts, empty bottles, and many other

wastes.). Daily fishing practices such as the use of dynamites, dragging of fishing nets, overfishing and over exploitation of marine resources have destroyed coral reefs and led to the loss of marine life.

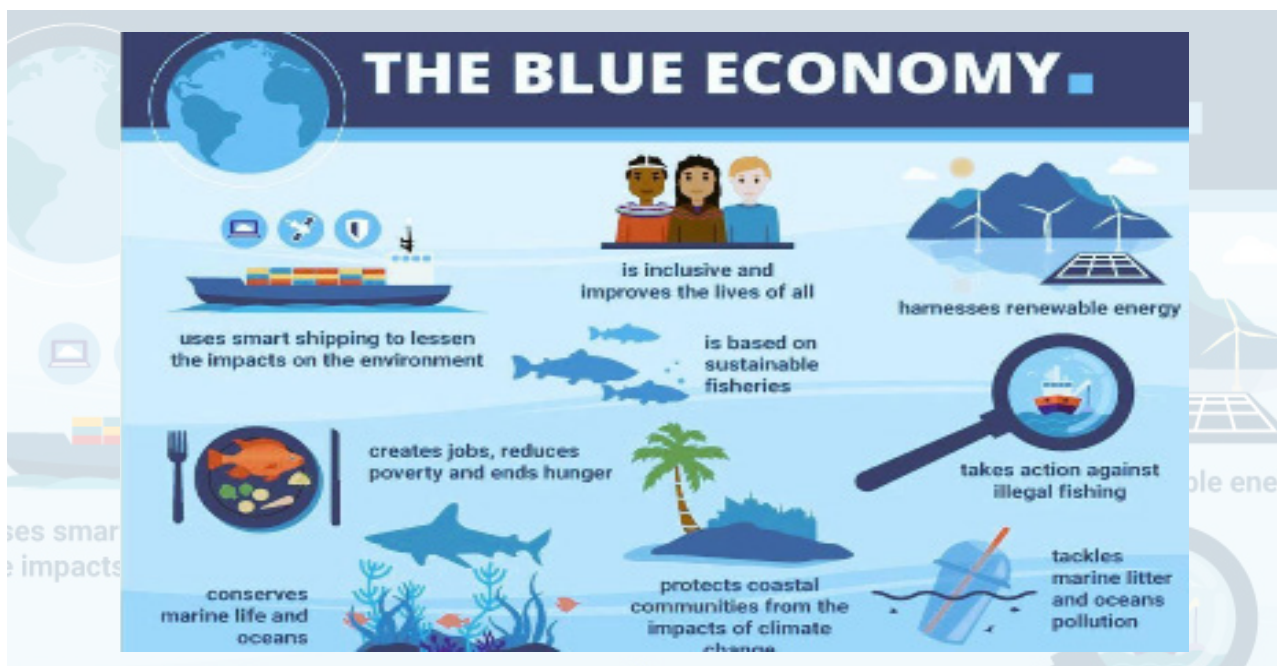
FIGURE 11: Ela Beach been polluted by plastics and debris²⁹



To avoid these and ensure sustainable use of the ocean resources, a **“blue economy”** is an approach that looks at the economy of the sea, and essentially highlights the sustainable:

- Use of marine resources
- Renewable energy, e.g., wave energy, geothermal, etc.
- Undersea mineral/mining, etc.

• **FIGURE 12: The Blue Economy³⁰**



28 Source of image: *Nigel Uyam. (2019) Chineses-owned Ramu Nickel Plant spills 200, 000 Litres of 'toxic' slurry into the sea* [online]. Available at: <https://www.abc.net.au/news/2019-08-30/chinese-owned-mine-in-png-spills-200000-litres-of-toxic-slurry/11464108>

29 Ela Beach, Port Moresby, PNG, <https://cdn.audleytravel.com//79/216162002254220018242116158141243006225090043074.jpg>

30 What is the Blue Economy? <http://www.blueeconomyconference.go.ke/what-is-the-blue-economy/>

The blue economy ensures conservation and sustainable use of the oceans and seas and of their resources for sustainable development. (The initiatives relating to Blue Economy are given in Green Business Basics Module).

3.3 Green Economy Principles

Green Economy Principles. The green economy principles are:



Well Being: A green economy will create genuine, sustained, shared well-being, going beyond monetary wealth to prioritize human development, health, happiness, education, and community.



Justice: A green economy emphasizes equity, equality, community cohesion, social justice and supporting human rights. This is especially for the rights of marginalized minorities. This seeks a just transition and serves the interests of all citizens, including those yet to be born.



Planetary Boundaries: This recognizes that all human flourishing depends upon a healthy natural world. It defends nature's function and limits and protects biodiversity (forests, plants, animals), soil, water, air and other ecosystem capitals.



Efficiency and Sufficiency: A green economy is low carbon diverse and circular. This recognizes that our biggest economic challenge is the need to create prosperity within planetary boundaries and align economic incentives with true costs to the society.



Good Governance: A green economy builds institutions that combine dynamic democratic accountability, relevant matrix, sound science and local knowledge. Civil life prioritizes public participation, social dialogue, transparency, and accountability.³¹

3.4 Green Economy Strategies

FIGURE 13: Green Economy- Strategies³²



³¹ Adapted from: <http://gggi.org/site/assets/uploads/2019/06/5-principles-of-GE-One-Pager-250619.pdf>

³² CEDEFOP, Green Economy, 'A great opportunity', <http://www.cedefop.europa.eu/en/news-and-press/news/green-economy-great-opportunity>.

The figure illustrated above shows some of the strategies that are implemented in investing in research, technology, development, and innovation transition towards a green economy. These include the use of renewable sources of energy (solar, hydro, wind, tidal, geothermal and biomass energy), wastewater treatment, solid waste recycling and recovery, green constructions and buildings and environmentally friendly equipment and industrial activities.

PNG is heavily dependent on fossil fuels like petrol and diesel for transport and electricity. Fossil fuels contribute to air pollution and climate change, thus the transition to renewable sources of energy reduces greenhouse gas emissions and creates cleaner transport and energy generation systems.

FIGURE 14: Solar panels installed on a household roof³³



Figure 14, shows four solar panels installed on a household roof in Keapara Village Central Province, PNG. The Panels are used to provide electricity for individual household consumption.

Moreover, greener strategies help to build resilience against the effects of climate change. The installation of solar panels meets energy needs in times of drought when electricity is difficult to be generated through hydropower sources. Recycling of solid wastes reduces consumption of natural resources, reduces destructive human activities to extract these resources, reduces waste disposal and greenhouse emissions.

Waste reduction and production of goods may be generated through practicing the 3R's, that is reduce, re-using and recycling. This further helps in individuals in developing green businesses, where income can be generated from recycled products.

FIGURE 15: Women and children preparing used packets to make eco bags³⁴



FIGURE 16: Readymade eco bags on display for sale³⁵



3.5 Green Economy Benefits

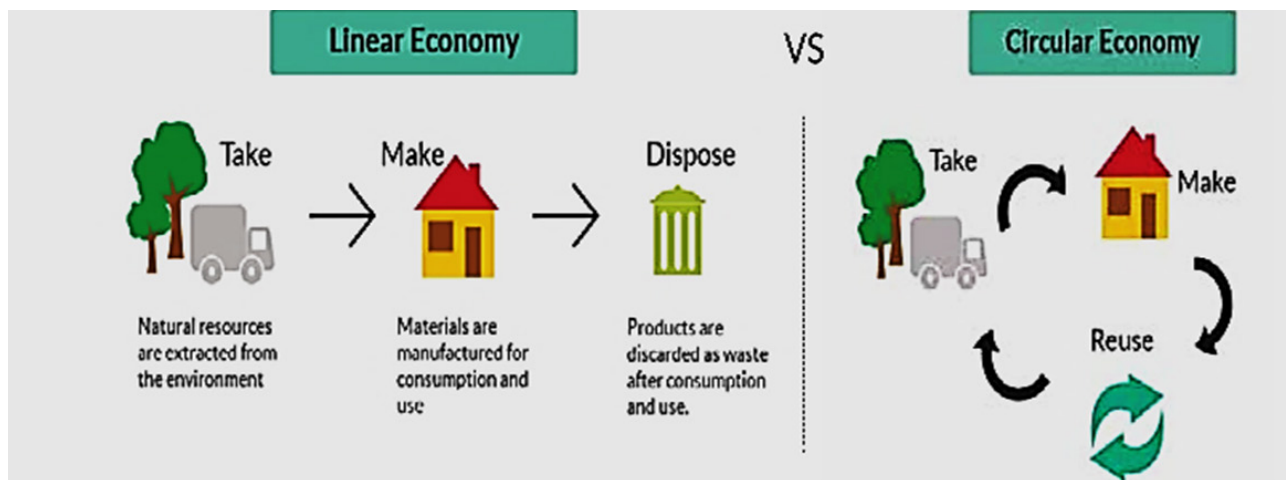
It is possible to recover wealth from waste, and this can be achieved when we understand the difference between a linear and circular economy, in order that we appreciate the benefits of a green economy. The difference between linear and a circular economy is given in Figure 17.³⁶

³³ Photo credit: Benjamin Keni.

³⁴ Source: Global Vision International, <https://www.fijimarinas.com/wp-content/uploads/2014/02/Daughtersof-Charity.jpg>

³⁵ Source: Global Vision International, https://www.fijimarinas.com/wp-content/uploads/2014/02/941279_602543906458238_1100264826_n.jpg

FIGURE 17: Linear vs Circular Economy³⁶



A linear economy is one which follows the 'take-make-dispose' step by step plan. This is such that raw materials are collected, transformed into products that are used until they are finally discarded as waste.³⁷ A circular economy on the other hand, is a model of production and consumption, which involves recycling, reusing, and refurbishing existing materials if possible. The aim is to reduce waste and create further value of the products.³⁸

For example: In our everyday lives, we tend to generate rubbish due to our daily activities and it often ends up in landfills. Although our rubbish ends up in landfills, this still can contaminate water sources, take up land space, and burning of rubbish leads to air pollution. An alternative circular economy approach would result in reusing wastes that you can, e.g., bottles and Styrofoam containers, composting organic matter which further generates biogas, etc.

Following a circular economy approach, we practice the 3R's (**Reduce, Reuse and Recycle**) thus we benefit as there is:

- Reduction in generation of wastes as items are reused and recycled.
- Reduces pressure on the environment as resources are used sensibly and replenished for future generations.
- Reduction of greenhouse gas emissions, improves air quality and reduces air pollution
- Improvement of health in the lives of community members- as there is cleaner sources of water, energy, and air, reducing the spread of water borne and respiratory diseases.

- Creation of green jobs- new jobs could be created by adopting sustainable practices in areas of manufacturing, operating, and maintaining green technologies. This improves livelihood and can overcome poverty.

FIGURE 18: Waste products of a banana harvest³⁹



The figure above shows waste products of a banana harvest, this is re-used to make vegan wallets and other products.

³⁶ Graphics by Margaret Seruvatu, GGGI.

³⁷ Taken from, https://www.google.com/search?q=linear+economy+definition&rlz=1C1GCEA_

³⁸ Adapted from News European Parliament, "Circular economy : definition, importance and benefits," <https://www.europarl.europa.eu/news/en/headlines/economy/201512015-TO05603/circular-economy-definition-importance-and-benefits#>

³⁹ Green Banana paper, <https://greenbananapaper.com/>

ACTIVITY 3

Target: Local government officials, Provincial Councils, District Councils, Town Councils, Island Councils, etc.

1. What are some measures you will take to make your community to move away from brown economy?

Policy issues to ensure proper pollution control measures are in place, proper waste management and recycling, constant awareness programs specially for children and other vulnerable groups.

2. What are some measures you will take to develop blue economy?

Monitor illegal fishing through education and punitive measures, ensure preservation of mangroves, coral reefs. Monitoring mechanized fishing and the fishing season.

3. What are the issues you would take care of in addressing green economy?

- Low carbon growth and use of eco- friendly material. This will be done by education.
- Ensure energy, water, forests resources are used efficiently.
- Will ensure social inclusivity by involving all stake holders.

Target: Traditional community/religious leaders, women, youth, and vulnerable groups (single mothers, elderly).

1. Name some of the Green Economy Activities in your Community?

Green activities include proper waste management, (reducing, re-using, and recycling), planting trees and using natural resources wisely.

2. What is the difference between a linear and circular economy?

A linear economy is one which follows the 'take- make-dispose' step by step plan. This is such that raw materials are collected, transformed into products that are used until they are finally discarded as waste. A circular economy on the other hand, is a model of production and consumption, which involves recycling, reusing, and refurbishing existing materials if possible. The aim is to reduce waste and create further value of the products.

3. What are unsustainable/ harmful blue activities in your community?

- Throwing of plastic and other wastes in the beach and into the sea.
- Dragging of nets over mangroves damaging them.
- Dynamite for fishing.
- Oil spills from boats.

4. How are marine life affected?

The use of mechanized boats for fishing and tourism, larger ships for bulk transport and tourist cruises create pollution (air and water) and affect marine life. Larger mechanized boats also affect the fishing activities of smaller paddle and sail boats.

5. List any three of Low Carbon growth and Resource Efficiency Measures

Any three of the below:

- More efficient firewood cooking stoves
- Use of solar and other forms of renewable sources of energy
- Clean Water
- Segregation and waste disposal
- Controlled exploitation of forest wealth
- Use firewood efficiently
- Controlled use of water
- Waste Segregation and resource recovery

Target: Local electricians, people with technical aptitude, etc.

1. What are the green practices you will follow in your work on day-to-day basis?

Use good quality material, ensure proper tools are used, follow safe work practices, waste disposal.

2. How do you take care of blue economy in your work?

- Proper waste disposal when you repair a boat. Do not throw waste into the sea.
- Educate boat owners about quality of lube oil, fuel preventive maintenance.
- Avoid oil spills into the sea and if any initiate clean up measures.

Target: Small Businesses:

3. What are the business measures you would initiate to make it green?

- Horticulture using organic fertilized
- Ensure proper cleanliness of surroundings
- Use of quality material

4. What is the resource efficiency measures you will follow in green business?

- Use of renewable source of energy suited to the local community.
- Waste generated will be recycled and examine whether the same can be re-used. Apply the 3Rs strategy.
- Use of clean water for drinking.

4

**Shifting to a Green/
Blue Economy**—————

4.1 Shift to Green/Blue economy

Transforming to a Green-Blue Economy requires a shift in the way we think and how we do business.⁴⁰ If we can identify our economic, social, and environmental challenges, and how we become affected by them, we will be empowered to implement strategies that will solve these issues. The 3 pillars integrate to promote sustainability, with a broken pillar we cannot achieve SD and will continue to face challenges each day. The shift to a Green-Blue economy considers all these aspects and is a tool to achieving SDGs.

The most important needs of the community are access to clean energy, food, and water supply. A shift from practices of a brown economy to a green/blue economy will ensure that these needs are met and help community members tackle environmental issues, further improving the health and livelihood as discussed under the topic of green economy benefits (Topic 3.5).

4.2 Green/Blue Successful Stories in the Pacific

1. Tokelau, the World's first country to rely 100% on solar energy.

FIGURE 19: Sunny Island Inverters delivered by SMA control the standalone systems⁴¹



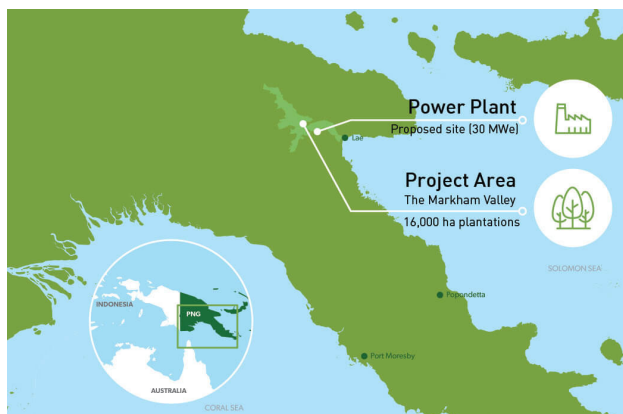
FIGURE 20: Official Commissioning of Solar system⁴²



Official commissioning of the system took place on the 30th of October, at a local ceremony. The project was initiated in 2010 and was completed two years later. The island nation of Tokelau shifted to the use of renewable sources of energy as an alternative to imported fuels as they are environmentally beneficial and have lower reliance on foreign energy sources.⁴²

2. PNG Biomass: An Iconic Renewable Energy Project.

FIGURE 21: PNG Biomass Project⁴³



Oil Search PNG Biomass project in the Markham Valley, is a renewable energy initiative in Morobe Province, which uses wood chips from trees sustainably grown to fuel a biomass plant to provide up to 30 Megawatt (MWe) into the Ramu Grid.

⁴⁰ Adapted from Pacific Islands Development Forum 2019-2030 Strategic Plan, <http://www.pidf.int/wp-content/uploads/2017/07/PIDF-Strategic-Plan.pdf>

⁴¹ SMA SOLAR TECHNOLOGY, <https://blog.ebv.com/from-zero-to-hero-tokelau-becomes-the-worlds-first-country-to-rely-100-on-solar-energy/>

⁴² You Tube video: "The Pacific Way-Season 9 Episode 20, 24 September 2014, <https://www.youtube.com/watch?v=P3iTeXRFo8>

⁴³ Adapted from PNG Biomass Homepage, <https://pngbiomass.com/project/>

3. Conservation of Marine Life through Mangrove and Coral Planting.

FIGURE 22: Mangrove Nursery⁴⁴



The figure above shows a local family mangrove nursery from Pinupaka Village, Kairuku District, Central Province. The mangrove seedlings will later be transplanted on the coastline in attempts to minimize coastal erosion.

FIGURE 23: Tourists undertake coral planting in Outrigger resort⁴⁵



Outrigger resort at Coral coast, Sigatoka, Fiji, has been undertaking coral planting programs as part of their wider resort Global Ozone conservation initiatives. It was launched in 2014 and it aims to rejuvenate coral health and resiliency.

4. Sustainable Fisheries.

FIGURE 24: FFA Logo⁴⁶



The Pacific Island Forum Fisheries Agency (FFA) was established to help countries sustainably manage their fishery resources that fall within their 200-mile Exclusive Economic Zones (EEZ). This has been effective in managing fish stocks in the Pacific.

5. Vanuatu Government- Solar Water Pumping Project.

FIGURE 25: Signing of Project Agreement⁴⁷



The figure shows officials from Vanuatu's Department of Water Resources, Department of Energy, in close collaboration with GGGI as they signed a Project agreement for a 2-year agreement funded by Government of Luxembourg, aimed at enhancing climate resilience through solar-power driven access to water in rural areas of Vanuatu.

44 Photo Credit: Benjamin Keni

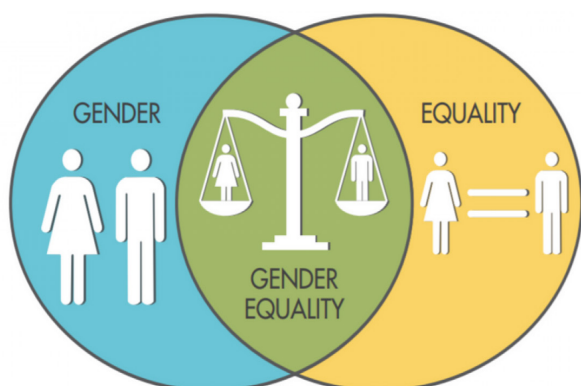
45 Outrigger Hotel and Resorts, <https://www.outrigger.com/stories/2019/june/coral-planting-2019>

46 Pacific Island Forum Fisheries Agency (FFA) <https://www.humanrightsatsea.org/2019/08/06/pacific-forum-fisheries-agency-enacts-new-crew-welfare-regulations/> or visit <https://www.ffa.int/>

47 Adapted from, <https://gggi.org/gggi-signs-project-agreement-with-vanuatu-government-to-implement-solar-water-pumping-project/>

4.3 Gender Equality

FIGURE 26: Gender Equality⁴⁸



The shift to a green/blue economy becomes successful when we consider gender equality (Figure 26). It means that different behaviors, aspirations and needs of women and men are considered, valued, and treated equally. It does not mean that women and men must become the same, but that their rights, responsibilities and opportunities will not depend on whether they are born male or female. The commitment to leave no one behind as part of the SDG's calls for equal participation in community decision making.

(Refer to Module on Gender and Inclusive Development).

Women play important roles in our households, from taking care of the young, managing family needs, to outdoor activities they involve themselves in. It is, therefore, important that women are introduced to the concepts of green economy general principles and its trainings.

FIGURE 27: Women and Green Economy⁴⁹



With the knowledge gained, they will be able to adopt alternative greener measures in daily activities, such as the management of natural resources, reuse of materials to make more products, this, also, in which they can generate income for themselves. All knowledge gained can then be passed on to the young ones. Greener practices, lead to a cleaner environment and this will improve their health. All these will ensure a better quality of life. Women's equal participation in these initiatives will contribute to women's empowerment, and Gender Equality and in turn contribute to the achievement of the SDG's.

48 SAIIA organization, "Gender Equality: A Cornerstone for a Green Economy", Photo credits, (Agnes Bubugura), <https://saiia.org.za/research/gender-equality-a-corner-stone-for-a-green-economy/>

49 Photo by Paul Harris, adapted from Awl images, <https://www.awl-images.com/stock-photo-south-pacific-fiji-kadavu-fijian-islander-creating-a-floor-mat-out-of-image00018159.html>

4.4 Reduce Hunger

FIGURE 28: Reducing Hunger⁵⁰



Practicing Green Economy principles means the sustainable use of resources and having access to cleaner sources of energy and water. Figure 28 above explains how hunger can be reduced.

4.5 Health

FIGURE 29: Importance of Health⁵¹



SDG 3 aims for Good Health and Well-Being. Ensuring healthy lives and promoting the wellbeing at all ages is essential to sustainable development. PNG like Fiji and many other small Pacific Island countries experience significant

problems associated with Non-Communicable Diseases.⁵² A noncommunicable disease also known as a chronic disease, is a noninfectious health condition that cannot be spread from person to person. A combination of genetic, physiological, lifestyle, and environmental factors can cause these diseases. The following are the non-communicable diseases.

- Cardiovascular diseases (CVDs).
- Cancer.
- Diabetes.
- Dementia.
- Hypertension.
- Obesity and overweight.

The green economy initiatives will ensure, improved and energy- efficient heating and cooking facilities, improving air quality, and reducing indoor pollution and respiratory diseases. Access to clean drinking water, reduces diseases such as typhoid, diarrhea and other water borne diseases. Proper waste management and disposal ensures a healthier, cleaner environment to live in.

All the above will make people healthy.

⁵⁰ Adapted from United Nations: Zero Hunger Challenge, "Transforming our food systems to transform our world", <https://www.un.org/zero hunger/ar/content/challenge-hunger-can-be-eliminated-our-lifetimes>.

⁵¹ Source: United Nations, Department of Economic and Social Affairs, Sustainable Development, <https://sdgs.un.org/goals/goal3>

⁵² Adapted from Health Policy & Health Finance Knowledge Hub, "Non-communicable diseases and health system responses in Fiji", August 2013, https://www.nutritionandhealthfiji.com/uploads/5/7/2/8/57283159/user_kelseym_wp_34.pdf

4.6 Green Ambassadors

It is proposed to nominate preferably women as 'Green Ambassadors', in the community. Identification education, training, publicity is the responsibility of all stake holders (community, religious leaders, local governments, NGOs, financial institutions). Women or any other person nominated as Green Ambassador should have the ability and aptitude for the work. This will also contribute to meeting women's strategic needs, as they will gain recognition as valuable members of the community who are able to provide guidance to the community and ensure sustainable practices are carried out and maintained.

FIGURE 30: Green Ambassadors⁵³

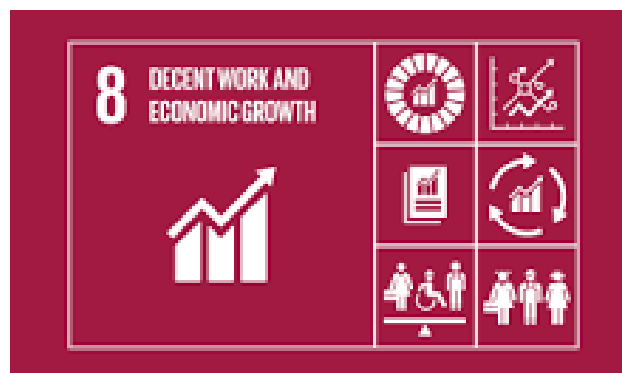


The green ambassador is expected to:

- Facilitate initiation of green economy principles in the community. This will be done by education and publicity campaigns.
- To be a 'Watch dog' for green initiatives. This is to be done by routine visits and monitoring.
- Trouble shoot any green practice issues by demonstration. (e.g.: waste segregation, water purification.
- Bring any issues /successes to the notice of the community leaders. (Success stories, health issues, non-cooperation by some etc.)
- Community Leaders to incentivize 'Green Ambassador' (praising his/her work, giving importance for community decisions, funding training expenses).

The above is expected to sensitize the various stake holders towards our march to green economy. It is important to prepare proper publicity material, keeping the community education status in view with flexi boards/ posters with graphic illustrations of local photographs. It is quite common that given the weather conditions, the flexis get torn, sometimes damaged by children/animals thus it is essential to allocate money to install flexis properly and maintain them.

FIGURE 31: Decent Work and Economic Growth⁵⁴



Having a green economy will bring about sustainability and help us in achieving the SDGs. Sustainable development aims to reduce poverty, allow social inclusion, improve human welfare, and create and promote opportunities of greener, decent jobs. This further results to economic growth enabling both men and women to take care of their families. The green/blue economy principles will improve economic profits while simultaneously, maintaining the healthy functioning of the ecosystem.

⁵³ EVAPO-COOL portable climate solutions, <https://www.evapo-cool.com/fag>

⁵⁴ The Global Goals for Sustainable Development, <https://www.globalgoals.org/8-decent-work-and-economic-growth>

ACTIVITY 4

Target: Local government officials, Provincial Councils, District Councils, Town Councils, Island Councils, etc.

1. How do you facilitate the shift to blue / green economy through your government initiatives?

- Policy guidelines to promote green economy..
- Education and awareness campaign by requesting CSR activities through various stake holders.
- Beach / marine policing to avoid non-green activities
- Creating Awareness.

2. What measures you will initiate to reduce the risk of non-communicable diseases?

- Source /facilitate sourcing of funds for clean water and quality air.
- Improvement of primary health care in the community.

3. How will you identify green ambassadors?

Green ambassadors can be identified through the earlier role played by the community men and women who have shown interest in community promotional activities earlier. Will incentivize the green ambassadors to work to promote greenness.

4. How do you ensure decent work leads to community economic growth?

- Ensure creation of opportunities for work (e.g., Construction, agriculture)..
- Proper and Prompt payment of wages.
- Participation of women and other vulnerable groups.
- Avoid child labor.

Target: to all other groups.

1. Discuss how you shift to green / blue economy in your community?

- Access to clean energy, water.
- Efficient Waste Management and Recycling.
- Sustainable/proper Waste Disposal.
- Use forest wealth judiciously.
- Avoid over exploitation of fishing, sand.
- Access to health facilities.
- Gender Equality.
- Repeated awareness and education.

2. Define Non- Communicable Disease

A noncommunicable disease is a noninfectious health condition that cannot be spread from person to person. It also lasts for a long period of time. This is also known as a chronic disease. A combination of genetic, physiological, lifestyle, and environmental factors can cause.

3. List three non – communicable diseases

Any three of the below

- Cardiovascular diseases (CVDs).
- Cancer.
- Diabetes.
- Dementia.
- Hypertension.
- Obesity and overweight.

4. What is Community Structure

The group of people forming a community with a community leader. The community leader plays a very critical role in weaning the community from bad practices, educating them with good practices and monitors the community activities. He is also the link between the community and the government. He should have the ability to source funds, decide on areas of spending and accountable for the community development.

5. Who is a Green Ambassador?

A Green Ambassador is someone who facilitates identification education and training, publicity is the responsibility of all stake holders (community, religious leaders, local governments, NGOs, financial institutions).

6. What is the role of Green Ambassador?

- Facilitate initiation of green economy principles in the community. This will be done by education and publicity campaigns.
- To be a 'Watch dog' for green initiatives. This is to be done by routine visits and monitoring.
- Trouble shoot any green practice issues by demonstration. (e.g.: waste segregation, water purification).
- Bring any issues /successes to the notice of the community leaders. (success stories health issues, non-cooperation by some etc.)

7. What are the benefits of women in the community towards practicing Green Economy Principles?

The women are the ground level warriors. They trek long distances every day to fetch, water, firewood, and other daily needs. They use fuels in poorly designed stoves taking longer time to cook. They need to tend the animals, sweep to keep the surroundings clean. They need to take care of their babies/ children. They get up early to prepare food to send their men to work and children to school. At the end of the day when darkness sets in, they have limited /no access to light (be it solar, kerosene, candles).

The practice of green business principles will change this. The cooking will be pollution free, faster, solar lighting will provide them with a better quality of life, with more time for leisure and income generating activities.

8. How does decent work lead to Economic Growth?

Decent work all the year round, work security, alternatives to meet the vagaries of the nature. This leads to economic growth enabling the men and women to take care of their families. Practicing Green economy will lead to more time available. This can generate additional income through setting up a grocery store, tailoring, carpentry, and other SME activities.

5

Natural Resources and Community Resource Management

5.1 Preservation of Natural resources

Biological resources provide the basis, for life on earth. As much of PNG's economy is based on the use of natural resources and the benefits and services provided by natural, healthy ecosystems, there is a strong need for conservation, preservation, and management of these resources. The natural resources that will be discussed in this module are water, soil, animals, and forests.

FIGURE 32: Natural Resources⁵⁵



5.2 Water

Sources of water include springs, river, underground water, etc. Water conservation and management is aimed at managing water or the sustainable use of it, to meet current and future demands. Factors such as climate change, population household size, industrial and agricultural activities, affect the amount of water used and excessive withdrawals of groundwater can lead to saltwater intrusion.

Moreover, community members can meet water needs by taking care of water sources such as rivers and springs and avoid polluting them. The PNG Government has made commitments as part of its National Development Plan and vision 2050 targets 100% access to safe, drinking water and sanitation by year 2050.

FIGURE 33: Natural Resource Water⁵⁶



5.3 Forests

Forests and trees are integral to the culture, health, and livelihoods of Pacific Islanders. Forests are providers of socioeconomic needs such as forest food banks, traditional medicines, wood for building materials and fuel, and it also provides products for sale and export.⁵⁷ Commercial forestry was and is still a major extractive industry and rural employer in PNG that has significantly contributed to the country's overall GDP and development over the years. PNG been a country with massive forest covered areas, forestry products contribute a major component of the country's overall exports annually. Over the years the increase in unsustainable logging as now put a threat to the country's forests.

It is important to understand and appreciate the fact that forests are providers of ecological services such as coastal and water shed protection, soil replenishment, water purification and act as carbon stocks.⁵⁷

Unsustainable practices of forestry for agricultural purposes and illegal logging have had negative impacts on the freshwater and terrestrial biodiversity. This results in the increase in the deforestation rate, destruction of species habitats, pollution and depletion of water sources and displacement of many native species, etc. This further affects the ability of the forest in providing ecosystem services and protection against adverse weather effects.

⁵⁵ You Tube video: "Natural Resources", 23 September 2020, https://www.youtube.com/watch?v=q9XzTI_Krlo

⁵⁶ Taken from Climate Vulnerability Assessment, "Making Fiji Climate Resilient", <https://cop23.com.fj/wp-content/uploads/2018/02/Fiji-Climate-Vulnerability-Assessment-.pdf>

⁵⁷ Adapted from Pacific Community (SPC) 2016, "Vulnerability of Pacific Island agriculture and forestry to climate change", <https://www.sprep.org/attachments/VirLib/Regional/vulnerability-pacific-island-agriculture-forestry-climate-change.pdf>

For that matter any logging company that have interest in conducting business in PNG must abide by and follow all rules and regulations so as have a timber permit as outlined in the National Forestry Act 1991 of PNG before they are granted permission to log and also export.⁵⁸

The community members are to be educated on ways to enhance the resilience of forests. Some applicable measures that communities can follow include:

- Improvement of land use planning.
- Re-establishment of forests through planting of more trees. For every tree cut, they should plant two more trees and maintain them.
- Adopting community- focused approaches that will strengthen a system of understanding and sharing knowledge and skills required for the protection of forests.
- Re-introducing and adopting PNG's traditional practices, such as traditional farming then modern mono-cropping techniques.

FIGURE 34: Men conducting trunk measurements for carbon estimates⁵⁹



5.4 Soil

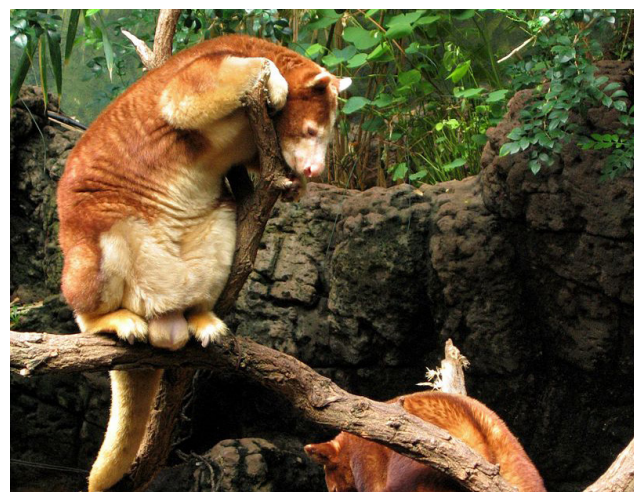
Preserving the nutrient value of the soil is the key element to soil conservation. However, to meet the needs of today's growing population, modern agricultural practices such as monocropping farming has threatened the foundation of agriculture, the soil itself. Mono- cropping is simply cultivation of the same crop in the same soil year after year.

When the community cultivates a particular crop for a longer time, the soil loses its fertility and productivity. Clearing land for roads and construction without proper measures leads to soil erosion and landslides and the continual use of chemical fertilizers result in nutrient depletion and deterioration of soil structure. Thus, it is advisable that community members stick to and practice their traditional systems of planting, this in which more than one crop species is grown at the same time and place, ensuring the control of the use of insecticide and weedicides, improving soil health management using cover crops and legumes (e.g., Beans).

5.5 Animals

PNG has a wide variety of animal species, including, marine, freshwater, and terrestrial species, most of which, has not been adequately documented, this is such as research tends to concentrate on economic importance. However, PNG's fauna ranges from birds, mammals, reptiles, amphibians, freshwater and terrestrial vertebrates and invertebrates etc. Wild animals are undomesticated animal species that include all organisms that grow and live wild in an area. Domestic animals are animals that have been genetically adapted over generations to live alongside humans.⁶⁰ These include dogs, cats, cattle, sheep, pigs, etc.

FIGURE 35: Matchie's Tree Kangaroo (*Dendrolagus matschiei*) is a protected wildlife species in PNG⁶¹



58 Papua New Guinea, National Parliament (1991), Forestry Act, Port Moresby, Department of Forestry (No.30 of 1991).

59 Source: GIZ/JHHofman: https://www.international-climate-initiative.com/en/news/article/sustainable_forestry_in_fiji

60 National Geographic, "Domesticated animals explained", [https://www.nationalgeographic.com/animals/article/domesticated-animals#:~:text="](https://www.nationalgeographic.com/animals/article/domesticated-animals#:~:text=)

61 Source: https://en.wikipedia.org/wiki/Matschie%27s_tree-kangaroo

5.6 Community based resource management

Community based resource management is management carried out by the communities over land, sea, or freshwater resources. It aims to benefit present and future members of the community and at times may be supported by external partners like Nongovernmental organizations (NGOs). Local knowledge is often practiced when it comes to management efforts, and this has been proven to be a potential source for the conservation of biodiversity and is management that is more likely to be respected and better fits a community's context.⁶²

Local people observe day-to-day changes and are among the first to notice if resources are no longer readily available. In addition, traditional knowledge locals or community

members possess help them to understand measures to take in preserving their natural resources. Traditional knowledge provides instant data through oral tradition, thus, there is a need for a 'community approach' with the implementation of 'traditional ecological knowledge' to benefit all members of the community now and in the future.

Moreover, community leaders such as village chiefs, elders and religious leaders must make wise decisions and set standards for communities to follow. They play an important role in promoting the principles of a green economy through the activities carried out in the community level.

The commitment to leave no one behind as part of the SDG's calls for equal participation in 'community decision making', and they must encourage inclusive participation of all community members especially that of women, youths, and vulnerable groups such as the elders and disabled.

ACTIVITY 5

Target: for all groups.

1. What are some types of natural resources?

- Soil
- Water
- Animals
- Vegetation
- Minerals

2. What are the sources of water in the community?

- River
- Springs
- Rain

3. Name three forest wealth (any of the below)

- Honey
- Timber
- Animals
- Birds
- Eco-system services, such as producing oxygen, guiding wind flow patterns etc.

⁶² Adapted from The Nature Conservancy, "Engaging women and men in community-based resource management processes in Solomon Islands. <https://www.worldfishcenter.org/content/engaging-women-and-men-community-based-resource-management-processes-solomon-islands>

6

Conclusion

FIGURE 36: Green Economy-Pathway⁶³

The key learning outcomes in this module are:

- Understanding the Green Economy Principles.
- Prioritizing Green Initiative options (renewable energy, clean water).
- Ensuring implementation and monitoring of green economy practices.
- Community participation – ensuring social inclusiveness in learning.

6.1 ROLE PLAY 1

The members of the community are to then act out a role play. For this, participants may volunteer, or trainer can choose participants to act out certain roles. For this role play, there is a need for 6 participants to play characters, Ben, Theo, Andrew, Lisa, Michael, Daniel.

Ben and Theo live along with their son Andrew and his wife Lisa. Ben is 60 years old and Theo 59 years. Andrew is 32 years old and Lisa 30 years. Andrew and Lisa have a 4-year-old son named Daniel.

All of them live in their house in a tropical island village. The house has decent space for gardening and some open space.

One day Ben heard a Public Announcement from the local authorities to plant tree saplings before the rainy season. The announcement also said planting a tree sapling will make the village community green and give lot of shade and makes the climate cool.

On hearing the announcement, Ben felt an urge to follow what was said. His house had a kitchen garden and a few flowering and ornamental plants. There was enough space available in the front to plant a tree sapling. Ben realized the sapling would grow to be a shady tree.

Ben went to a nearby nursery which stocks wide variety of plants, and the owner of the nursery is Michael.

Michael: Good Evening. I am Michael owner of the nursery, what can I do for you?

Ben: Good Evening, I am Ben. I am looking for some plants

Michael: I have flowering plants, vegetable plants and ornamental plants.

Ben: Did you hear the community announcement requesting people to plant trees for the coming rainy season.

Michael: That's a good one isn't it. Trees when they grow give a lot of shade.

Ben: Yes Michael. Please help with making a good choice for a tree sapling suited to the announcement.

Michael: Yes, you can take a neem sapling. The sapling will grow to a full tree in about 10 years and will last for many more years.

Ben: That sound good. Will take a neem sapling. Is there anything else I need other than watering it?

Michael: In the first year or two, it needs fertilizer. I stack organics composted fertilizer which is free of chemicals. I have stock and will give you. Take care of it till it grows to about 6 feet, you need to protect it from animals.

Ben: Oh! How will I do it?

Michael: Oh! That's Simple, I will give you tree guard. You cover the sapling and once it grows up to about 6 feet, you can remove the tree guard.

Ben: Fantastic! Let me take the sapling, organic fertilizer, and the tree guard.

Michael: Right now, I will give you one bag of fertilizer. You can buy more when you need them. This should last you for three to four months. Also take care to use paper bags to pack the fertilizer and avoid plastic bag.

Ben: Thanks Michael. Great! I Will be in touch.

63 Source: GEESKA AFRICA ONLINE, May 16, 2021, <https://www.geeskaafrika.com/ethiopia-launched-its-2025-climate-resilient-green-economy/>

Ben heads back home with the neem sapling, tree guard and the fertilizer paper bag. He rests for the night. He decides to wake up early in the morning to avoid the heat from the sun and plant the sapling.

Next Day, he gets up early. He starts digging a hole to plant the sapling.

After some time, Theo comes searching for Ben.

Theo: Hey! What are you doing?

Ben: Am in the garden. Planting a tree.

Theo: What type of tree?

Ben: Did you hear the announcement yesterday. I went to the nursery yesterday and bought a neem sapling.

Theo: Why do we need a Tree??

Ben: When it grows it will give shade. Also, the neem leaves and barks have lot of medicinal value.

Just then Andrew and Lisa arrive.

Andrew: Good Morning Dad. What are you doing?

Ben: Good Morning my son. Am planting a tree sapling.

Theo: Your dad went to the nursery yesterday and bought a sapling.

By then Ben had finished digging the hole and waters the poles.

Ben: Hey Andrew please get the paper bag lying there.

Andrew: Here it is dad. What is it?

Ben: This is organic fertilizer packed in Paper Bag. The nursery keeper Michael told me he does not use plastic bags.

Saying this he adds fertilizer to the hole and plants the sapling, waters it and places the tree guard. Ben's grandson Daniel runs around excited to see the tree sapling. Ben explains to Daniel the need to keep a watch and why a tree guard is needed.

Daniel: Grandpa. When will the tree grow big?

Ben: It should be 10 years or more. You should be around 14 then -a big Boy!!!

Theo: Oh 10 years. By that time, you and I will be gone.

Ben: I have not planted the tree for you and me. It is for Andrew, Lisa and Daniel. This is also for the entire community. When it grows big, it will be shady for Daniel to play. He will enjoy the chirping sound of all the birds.

Andrew: Sounds Pretty Good. I promise to take care of it.

Years pass by Ben and Theo pass away. The neem tree has grown into a very big shady tree.

Andrew: Hey Daniel. What are you doing?

Daniel: Am a big boy now. Am climbing a tree. Remember Grandad told us that when it grows it will give shade and I now hear the beautiful chirping sound of the birds.

Andrew: Yes, my son. I agree with what my late dad said. This tree will be here for many more years and many of us will benefit from it. Remember this is sustainability and this makes our planet greener.

Daniel: I understand that dad. Can you take me to the nursery so I can select a suitable sapling, plant it and take care of it?

Andrew: Sure, my Son. **I WILL!**

End of Roleplay

6.2 ROLE PLAY 2

In this role play, 5 participants are needed to play the roles of the Chief, Stella, Mary, and Thomas.

Women are gathered in the village hall preparing food for the visit of a government official. This conversation is taking place amongst a few of the women.

Stella: I was at the market on Saturday and the women from Imuagoro village were talking about their roles as Green Ambassadors for their village.

Mary: Really Stella, Green Ambassadors. I have never heard of that before, what do Green Ambassadors do?

Stella: From what they were saying, 3 of them have been identified as Green Ambassadors and they have received training to help them train members of their community in promoting the principles of Green Economy.

Mary: That sounds interesting, what are the principles of Green Economy?

Stella: Let's ask Thomas – I think he went to the training on Green Economy as well that was held in town last month. I will ask him to come and explain it to us, while we are all here.

Thomas: Hello, ladies – there are a lot of things involved in maintaining a green economy but few that I can tell you are the things that you are involved in every day:

- Making sure that the community is using clean water for drinking and cooking.
- Waste Management – making sure waste is properly disposed.
- Hygiene – Avoiding practices that are unhygienic, making sure the surroundings are kept clean and that there are no breeding places for mosquitoes etc.
- I have also been asked by the village leaders to identify some women as Green Ambassadors for this village – would any of you be interested?

Stella: Yes, Mary and I were just talking about that – we are interested.

Thomas: Ok, that's great – I will advise the leaders. I have recommended to them that you as women will make the best green ambassadors because you have a lot of influence in your homes and in the village.

Mary: Yes, we do, and we can also keep the village leaders updated during the village meetings. Can you make sure that we are invited to the meetings so we can provide an update?

Thomas: I will, and I will also ask the village chief to consider this as you are the best ones to ensure that we maintain the principles of a Green Economy.

(Thomas goes to see the Chief)

Chief: Yes Thomas, what can I do for you?

Thomas: Chief I have just been talking to the women and we have 2 of them who are interested in becoming Green Ambassadors for our village. They are the best ones to make sure we maintain the principles of a Green Economy. I hear the women from the nearby village of Imuagoro are making a huge difference in their village and taking their roles as Green Ambassadors seriously.

Chief: Ok Thomas – I am happy to do as you are proposing – let's take it up at the village meeting next week and also invite the women in particular Mary and Stella to come and share their views about being Green Ambassadors.

Thomas: I will do Chief and it's a great opportunity to include the women in all the village meetings from now on and to recognize the important role women play in our community.



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