# Building Adaptive Capacity for the Impacts of Climate Change ：
# A Model Programme on Community-based “Education/Training”

*Edited by*
ESDRC, Rikkyo University
PACE-SD, the University of the South Pacific

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Note: This paper was edited by the Education for Sustainable Development Research Center, (ESDRC), Rikkyo University, and the Pacific Centre for Environment and Sustainable Development, the University of the South Pacific. PART 1 was written by Osamu Abe (the Director of ESDRC), Ko Nomura (Nagoya University), and Yuichi Asai (Rikkyo University). PART 2 was written by Leone Limalevu (PACE-SD). PART 2 of this paper is based on the activities that were conducted by PACE-SD in various communities in the Fiji Islands from 2009 to 2010.

The working papers describe research in progress by the authors and are published to elicit comments and to further debate.

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ESDRC was founded in March 2007 and is based at Rikkyo University, with the aim of helping to consolidate ESD (Education for Sustainable Development) in our society. It was chosen to be a part of the 'Open Research Center' Project for the Japanese Ministry of Education, Culture, Sports, Science and Technology in 2007, concerning 'Developing Research and Educational Programs on ESD'.

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PACE-SD was inaugurated in August 2001 in recognition of the need by the University of the South Pacific (USP) to develop a focused and collaborative approach for environmental education, research, consultancy and capacity building in the Pacific Island region. By creating an enabling environment for collaborative initiatives, PACE-SD has been able to show USP and other stakeholders what an environment and sustainable development Centre should look and act like.

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# CONTENTS

# SUMMARY

This paper argues the importance of community-based education/training to build adaptive capacity to address the adverse effects of climate change in the Pacific Island Countries (PICs), and provides a model programme for it.

PART 1 explains two different approaches for climate change, namely *mitigation* and *adaptation*, and emphasises the significance of the latter in the Pacific Island Countries (PICs) considering the high *social* as well as physical *vulnerabilities* to the impacts of climate change. Subsequently, it discusses that *education* lies in the heart of the effort to develop adaptive capacity within local communities, through which local communities acquire the necessary knowledge about climate change and its impacts on their lives.

PART 2 is a model programme on education/training at local communities to build adaptive capacity to address the adverse effects of climate change. It provides procedural framework for facilitating community mobilisation and workshops to learn the mechanism of climate change, its possible affects, and the adaptive strategy. This procedure is developed based on the PACE-SD Strategic Adaptation Framework, which formulates the procedural steps to implement measures and enhance adaptive capacity. It also includes the educational material written in Fijian language about the difference between climate and weather.

It is suggested that the adaptation framework should be strategic in three ways. First, the assessment and plans are based on a firm understanding of the current socio-economic, cultural and environmental problems faced by the community. Second, it addresses critical problems related to climate change currently faced by the community, before sequentially addressing other aspects of climate change within the short, medium and long term. These three time frames neatly correspond to climate extremes, climate variability, and climate change. Third, it sets in motion a process that would initiate and catalyse community action that would enable them to develop in a sustainable manner.

# PART 1: *Adaptation* and *Education*

### 1.1 'Adaptation' for the impacts of climate change in PICs

The seriousness of the impacts of climate change in the Pacific Island Countries (PICs) has now become widely recognised. A number of international reports have demanded immediate action on this issue by underlining the potential damage to the region. For instance, the 2000 World Bank Regional Economic Report says that, by the year 2050, 25-54% of South Tarawa (Bikenibeu) and 55-80% of North Tarawa (Buariki) in Kiribati is in danger of being submerged, and the damage from climate change could be 17-34% of the national GDP from1998 (US$ 800-16,000). .

However, the contribution to the issue of climate change has tended to be largely perceived in the context of '*mitigation'*. The press has often reported the situation of small atoll countries such as Kiribati and Tuvalu in the last few years, but the story seems to have been told mainly to raise awareness towards the importance of reducing green house gases (GHGs), i.e. *mitigating* the impact of global warming. This emphasis on mitigation is an indispensable perspective to solve the issue of climate change; nevertheless, it is no less important to emphasise the importance of adaptation considering the situation of PICs. It is not only because PICs emit relatively small amount of GHGs, but also because they tend to be socially and physically more vulnerable to the effects of climate change in comparison with developed countries.

The case of cyclone 'Mick', which hit nearly all the Fiji Islands at the end of 2009, may serve as an example of the vulnerability of PICs to extreme climate events. It caused enormous damage to many local communities. The Fiji Times reported that in the Western Division, more than 43,000 people were affected by the cyclone with 1,041 houses damaged valued at $6500 each (in Fijian currency[1]). In addition, about $57,550 livestock was damaged while the estimated cost of damaged roads in the Western Division was $555,000. Another $160,065 in damage was noted for 24 schools affected by the cyclone. Ten per cent of the agriculture sector in the Northern Division suffered about $567,200 in damage. In the Central Division, about 6,051 people were affected with four houses completely destroyed at an estimated cost of $16,000 each. Another 170 homes were damaged in the Central Division. In the Eastern Division, 226 people were affected with five homes destroyed and 15 damaged (Fiji Times, 1/January/2010).

As the numbers show, the damage caused by the cyclone was especially severe on local communities. One could easily imagine that this kind of catastrophical damage on homes could be a direct cause in the break-up of family life, but this break-up could be further aggravated by other social vulnerabilities such as poverty[2]in local communities where the majority of people do not have a

[1] 1 FJD = 0.53 USD as of 19/December/2010

[2] The average GDP per capita in independent nations in South Pacific region is no more than US$ 3,000. The gap between the rich and the poor, or between the recipients and the non-recipients of the benefits from international trade, is enormous in this region, which is the cause of the poverty

stable income and have no other choice in making a living other than farming and fishing Etc.[3] This indicates that the impacts of climate change cannot be only physical damage such as damage to roads, livestock, and other sources of lifeline, but also social damage, which emerge more noticeably and severer in countries like PICs in comparison with developed countries.

As this example shows, vulnerabilities should be analysed in two aspects: *physical* vulnerabilities (e.g. land area loss and threats to agricultural production) and *social vulnerabilities* (e.g. disruption to livelihoods) (Adger, 1996). The latter is more acute and directly connected with the issue of climate change in PICs. It is true that physical or material assistance for housing and other sources of lifeline are absolutely necessary to deal with climate change. Technology and infrastructure, such as seawalls for the case of accelerated sea-levels, can help address *physical vulnerabilities*. However, the focus of the discussion about climate change in the context of PICs should be put on social vulnerabilities, that is, how to become socially resilient to the effects of climate change. Accordingly, how to build *adaptive capacity* to the impacts of climate change is an essential question in the context of PICs.

Given the lack of resources, international assistance needs to be provided for PICs to strengthen *adaptive capacity* for the impacts of climate change. JICA (Japan International Cooperation Agency) has emphasised the importance of support for building adaptive capacity as a crucial approach to the issue of climate change in PICs. JICA also points out the significance of the role, which local communities can fulfil to build up adaptive capacity and empowerment within communities (JICA, 2007).

Educational activity to build up adaptive capacity is considered to lie at the bottom of dealing with climate change. In Kiribati, for example, 80% of the national priorities identified by local stakeholders were 'not visible investments, but related to heightened awareness, behavioural changes, subtle adjustments and better enforcement of existing policies and regulations' (Bettencourt et al, 2006:14). 'Adaptations are manifestations of adaptive capacity, and they represent ways of reducing vulnerability' (Smit and Wandel, 2006, 286)[4]. In this context, ESDRC understands that *education* in communities is the key to effectively raise awareness of the significance of the effects of climate change and build up adaptive capacity in PICs, in which social vulnerabilities are comparatively higher.

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being one of the biggest issues in South Pacific region.

[3]In Fiji's case, house-building is mostly done by community members themselves, which could take a long process since people tend to have insufficient time for communal work engaging in farming and fishing in their daily life.

[4]Vulnerability of any system is 'reflective of (or a function of) the exposure and sensitivity of that system to hazardous conditions and the ability or capacity or resilience of the system to cope, adapt or recover from the effects of those conditions' (Smit and Wandel, 2006, 286).

**1.2 'Education' for developing adaptive capacity and social vulnerability**

If one regards education to include formal education (FE), non-formal education (NFE), and informal learning, one would find that education lies in the heart of the effort to develop adaptive capacity, especially in relation to *social vulnerabilities*. In fact, the educational elements have been manifested as one of the main parameters to determine adaptive capacity in various reports. For example, the Intergovernmental Panel on Climate Change (IPCC) notes that 'the adaptive capacity of small island states will need to be built up in several important areas including *human resources development*, institutional strengthening, technology and infrastructure, and *public awareness and education* (Mimura et. al., 2007, 206; emphasis added). Developing 'human resources' and raising 'public awareness' is important because local people have to deal with the ever changing environment in a 'pro-active' manner. In addition, they need to have the capacity to make their own decisions to suit their way of life in an autonomous way, rather than passively accepting the 'right' measures given by others.

The educational elements are emphasised in various reports. The World Health Organisation (WHO) notes that the main determinants of a country's adaptive capacity to climate change are: economic wealth, technology, *information and skills*, infrastructure, institutions and equity (WHO, 2003, emphasis added). The importance of education to build adaptive capacity was also acknowledged at an ESDRC-hosted international symposium, "Building Adaptive Capacity for Climate Change in the Pacific: Challenges for Education and International Cooperation", held on 18 January 2009[5].

SPREP (Secretariat of the Pacific Regional Environmental Programme) also emphasises education for local communities in "*Action Plan for Managing the Environment of the Pacific Island Region 2005-2009"*. The emphasis of education in this action plan is inherently connected and applicable to build up adaptive capacity to deal with the impacts of climate change in PICs:

> Increasing and improving training activities, and exchanging experiences between Pacific island countries and territories is central to the successful implementation of this Action Plan. Most Pacific island countries and territories need to strengthen the technical, institutional and human resources capabilities of their nationals.... Improving education and public awareness activities is central to the successful implementation of this Action Plan, stressing the need to engage local communities. Assistance will be sought for advocacy, awareness raising and education.... Successful planning and implementation of environmental protection and sustainable development programmes and interventions require adequate national institutional and human capacities. A population that is well informed and aware through effective communication and access and use of appropriate technologies and information dissemination systems is critical to this. There will be a focus on improving support to facilitate sustainable knowledge management in Pacific island countries and territories, including sharing, learning and best practice, tools and

[5] The information from the symposium can be found at;
http://www.rikkyo.ac.jp/research/laboratory/ESD/eng/event/report/20090118.html

guidelines, databases and directories, geographic information systems, information dissemination, national and regional clearing houses for environmental information and a knowledge base of success stories.

*SPREP's Strategic Programmes 2004-2013* is compiled by SPREP to implement the above action plan and highlights the significance of education in framing and implementing environmental policy related to adaptation as 'Proposal for Capacity Building for Climate Change Adaptation finalised and implemented'[6] and 'Regional and national environmental education, communication and awareness strategies developed and implementation supported' (SPREP, 2005b: 24-31).

Considering the fact that the local people are the ones who actually have to cope with the (often unexpected) ever-changing environment time after time, preferably in a 'pro-active' manner, the key to build up adaptive capacity among them is education. Even though many villagers are recognising small changes in their daily life, such as agricultural production and fish catch, it is very difficult to relate those changes to the long-term climate forecast, which in turn results in no effort by communities to deal with climate change. Therefore; education is the key (possibly the most needed element) to provide villagers with knowledge of the mechanism and the seriousness of climate change and its impacts, and to encourage local communities to build adaptive capacity in local communities by themselves.

### 1.3 Research needs and implementation

While such needs for education to build adaptive capacity in communities are identified, there is limited research and practice in relation to the above. Adger (1996) pointed out that much attention is still given to *physical vulnerabilities* at the expense of examining *social vulnerabilities*, to which educational research can make significant contributions. In addition, research 'that focuses on the implementation processes for adaptations' in general 'is still not common' (Smit and Wandel, 2006, 282). This is particularly true at a community level (Reidlinger and Berkes, 2001; Dolan and Walker, 2004), regardless of their importance. However, if physical vulnerabilities were inherently connected to more fundamental social vulnerabilities, physical assistance would be a secondary issue. Paying attention only to physical vulnerabilities would not create long lasting effects to deal with climate change as a whole.

The importance of assisting adaptation in developing countries is even more important from the viewpoint of fairness– developed countries should also share the cost of adaptation practices in developing countries, which the latter should not have borne if the former had not made the issue so serious. However, much of the cost of adaptation now seems to be falling onto communities and individuals in developing countries. Considering the lack of resources in places, which it is needed

[6]'Capacity Building for the Development of Adaptation Measures in Pacific Island Countries [CBDAMPIC] Project' was implemented with the aid of CIDA from 2002 to 2005.

to develop adaptive capacity as, mentioned earlier, especially concerning communities vulnerable to the effects of climate change, research and practice need to be promoted in the context of mobilising and promoting international cooperation in this field.

Against this backdrop, ESDRC and PACE-SD conducted a joint research project to create a model educational programme at a community level to build adaptive capacity for the adverse effects of climate change. The authors believe that this programme has significant applicability for communities in the other countries within the Pacific region too.

**PART2: A Model Programme on "Education/Training" at a Community-level to build Adaptive Capacity to Address the Adverse Effects of Climate Change**

**Community mobilisation for the construction of parallel groynes to minimise coastal erosion Navukailagi village - 2009**

**Where there is a will, there is a way – come what may!**

## 【2.1 Education/Training Programme Overview】

(For the facilitator and for the distribution of participants)

**Step1**: Describe the objectives and expected outputs and outcomes of the climate change education and training programme.

**Step 2**: Define and explain the weather and climate systems, global warming and climate change.

**Step 3**: Describe what "leaders" and "scientists" are doing about climate change.

**Step 4**: Identify and describe the challenges and opportunities in addressing climate change.

**Step 5**: Use the PACE-SD Strategic Adaptation Framework to address climate change.

**Step 6**: Use the PACE-SD Project Cycle to plan and schedule the adaptation project.

**Step7**: Use the PACE-SD Procedural Framework to mobilise community and technical experts to assess vulnerability, plan, implement and monitor the adaptation activities.

**Step 8**: Preparation for a community vision, a sustainable development plan and the strategic climate change adaptation plan.

**Step 9**: The way forward – where to start and what to do?

**Step 10**: Evaluation of the education and training programme.

## 【2.2 Resource Requirements】

- **Course Facilitators**- (Minimum requirement)The Facilitator for the training course should be someone who has a good level of understanding about climate change, sustainable resources management experience and preferably someone who has some level of understanding on the concept of sustainable development. The facilitator could also be someone who has undertaken the Training of Trainers course specific to this training course.
- **Equipment** - flip chart, coloured pens, ball point pens, note books, sticky tape, laptop and overhead projector.
- **Training venue** – A spacious room or community hall that can sit a maximum of 30 participants comfortably, and allows space for the convening of working group activities.
- **Duration**-If the facilitator is a "first timer", then allow for a maximum of five (5) days. Ideally for an experienced facilitator, a maximum of three (3) days is required. To keep the community together for a period of up to a maximum of 5 days requires proper prior planning, resources (food and money), and flexibility during the training days.
- **Communication**-Ideally the language used should be that of the community. However, if this is not possible, an experienced interpreter needs to be identified and training provided to proceed in a relatively much slower pace. Most of the pictures in the training manual are digital copies so these can be easily projected onto a screen. However, if the technology and equipment is not available at the community site, then it is necessary to prepare beforehand carefully drawn charts and diagrams to use during the training programme.

## 【2.3 Training Programme】

＜**Detail Level 1 :** For Training a Facilitator＞

**Step 1**: Describe the objectives and expected outputs and outcomes of the climate change education and training programme.

- Objectives
- Expected outputs
- Expected outcomes

**Step 2**: Define and explain the weather and climate systems, global warming and climate change.

**A. Definitions**

- Define and describe the term "weather"
- Define and describe the term "climate"
- Describe the factors that affect the earth's climate
- Describe the factors that affect the specific country's climate
- Describe the factors that affect the specific local community's climate and weather

➔ "Question and Answer Session"

**B. The science of climate change**

- Describe the solar system and radiation balance
- Describe the greenhouse effect
- Describe the enhanced greenhouse effect or global warming
- Define climate variability and climate change
- Describe the trends in carbon dioxide emissions, raising temperatures, and raising sea levels
- Describe climate change scenarios (carbon dioxide, temperature and sea levels)

➔ "Question and Answer Session"

**C. The possible impacts of climate change**

- Describe the possible impacts at a global level
- Describe the possible impacts at a regional and national level
- Describe the possible impacts at a local (community) level

➔ "Question and Answer Session"

**Step 3**: Describe what "leaders" and "scientists" are doing about climate change.

- Describe what the "leaders" are doing at an international level
- Describe what the "scientists" are doing at an international level
- Describe what the "leaders are doing at a regional level
- Describe what the "scientists' are doing at a regional level
- Describe what the 'leaders' are doing at a national level

➔ "Question and Answer Session"

**Step 4**: Identify and describe the challenges and opportunities in addressing climate change.

**A. Challenges**

- Existence of social and economic pressures
- Most of the future impacts can only be estimated
- Resource allocation provided by governments and donors may not be adequate
- Unsustainable developmental pathways continue to be followed by governments and communities

➔ "Question and Answer Session"

➔ "Working Group Session"

**B. Opportunities**

- Opportunities for communities to understand global, national and local socio-economic pressures
- Review of current socio-economic programmes in the community and an evaluation of their progress/situation regarding sustainability
- Formulation of a community vision, sustainable development plan and strategic climate change adaptation plan
- Funding for climate change programmes and activities can provide opportunities, initiate and catalyse "sustainable" community development

**Step 5**: Using the PACE-SD Strategic Adaptation Framework to address climate change.

- Define and describe the term 'strategy' and 'framework'
- Why do we need a strategy
- Describe the PACE-SD Strategic Adaptation Framework

➔ "Question and Answer Session"

**Step 6**: Using the PACE-SD Project Cycle to plan and schedule the adaptation project.

- Define and describe the term "project cycle"
- Why do we need a project cycle
- Describe the PACE-SD project cycle

➔ "Question and Answer Session"

**Step 7**: Using the PACE-SD Procedural Framework to mobilise communities and technical experts to assess vulnerability, plan, implement and monitor the adaptation activities.

- Define and describe the term "procedure"
- Why do we need the PACE-SD Procedural Framework
- Describe the PACE-SD Procedural Framework

➔ "Question and Answer Session"

**Step 8**: Preparation for a community vision, a sustainable development plan, and a strategic climate change adaptation plan.

**A. Vision and a Sustainable Development Plan**

- Define the term vision
- Define the term 'sustainable development'
- How to prepare a community vision
- How to prepare a community sustainable development plan

**B. Climate change adaptation plan**

- How to prepare a community strategic climate change adaptation plan

➔ "Question and Answer Session"

➔ "Working Group Session"

**Step 9**: The way forward – where to start and what to do?

- Review and obtain endorsement for the Community Vision (First Draft)
- Review and obtain endorsement for the Community Sustainable Development Plan (First Draft)
- Review and obtain endorsement for the Community Strategic Climate Change Adaptation Plan (First Draft)
- How to start from the endorsed plans
- How to seek government and external (donor) assistance

**Step 10**: Evaluation of the education and training programme.

- Evaluation questionnaire
- Reflection regarding the course with respect to the objectives, expected outputs and expected outcomes - Comments from participants and open discussions
- Concluding remarks from the community representative or leader (chief)
- Concluding remarks from the Course Coordinator

**- End of the Training Course-**

## 【2.4 The Model Training Programme】

＜**Detail Level 2:**For the Training Facilitator＞

**Step 1**: Describe the objectives and expected outputs and outcomes of the climate change education and training programme

- **Objectives**：The three main objectives of the education and training programme are:

(1) To educate the community on the determinant factors of climate change at a global, regional, national and local level.
(2) To educate communities on the causes and possible adverse impacts of climate change.
(3) Taking into consideration the impacts of other socio-economic stresses, to inform and guide the community on how they can best prepare themselves to address the adverse impacts of climate change.

- **Expected output**：The expected outputs of the education and training programme are:
  (1) A community vision.
  (2) A community sustainable development plan.
  (3) A community climate change adaptation plan.

- **Expected outcomes**：The expected outcomes of the education and training programme are:
  (1) The community would have an understanding of the determinant factors of the earth's climate; the Pacific region's climate; the country's climate, and the community's own climate system.
  (2) The community would have an understanding of the causes and possible adverse impacts of climate change.
  (3) The community would have an understanding of the various socio-economic drivers of change apart from climate change.
  (4) An appreciation of the importance of formulating a vision and sustainable development goals to effectively address the socio-economic drivers of change including climate change.
  (5) An appreciation of the importance of adopting an adaptation strategy and how this is applied to address the adverse impacts of current and future climate change.
  (6) The training programme would be the first step in building a capacity for the community to address the adverse impacts of current and future climate change.

**Step 2**: Define and explain the terms, weather, climate, global warming and climate change

**A. Definitions**

- Define and explain the term "weather":
  The state of the atmosphere at a particular place during a short period of time. It involves day-to-day changes such as in atmospheric phenomena, temperature, humidity, precipitation (type and amount), air pressure, wind, and cloud coverage.

- Define and explain the term "climate":
  The Intergovernmental Panel on Climate Change (IPCC) glossary definition is: Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of

relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organisation (WMO). These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. In a lay-man's term, climate is what you expect while weather is what you get.

- Describe the factors that affect the earth's climate:
  The differential heating of the earth's surface and its rotation around the sun affects ocean temperatures, pressures, wind intensity and direction. The earth rotates around the sun in a twenty-four hour period on its polar axis with the sun generally incident along the equator. Therefore those countries lying along or close to the equator would have the hottest climates while the climate would become colder as one move towards the poles. As for the seasons, this is caused by the slight tilt of the earth along it polar axis as it rotates around the sun. The earth's climate is largely controlled by the distribution of heating along its surface in relation to its axis as it is tilted relative to its orbital pane. As a result, the sunlight is incident at different angles at different times of the year. In June the northern hemisphere is tilted towards the sun, consequently receiving more energy that altitudes in the southern hemisphere. This effect causes the different seasons on an annual basis.

- Describe the factors that affect a specific country's climate (e.g. Tonga, Fiji, Samoa, Kiribati, etc.) :

  ***- General factors***

  Following on from the discussion from the previous section, the Pacific islands are generally located in the southern hemisphere, stretching from the equator (0° latitude) to approximately 25° latitude south. As these countries are located in the southern hemisphere, the hot season would be approximately from October to March. In terms of climate, Kiribati would be the hottest whilst Tonga and Fiji would be relatively cooler, while Samoa would experience temperatures colder than Kiribati and hotter than Fiji. For the South Pacific regions, cloud formation and rainfall on an annual basis is largely determined by the south east trade wind, while climate variability and climate extremes, from a one to ten year cycle, are largely determined by tropical cyclones and El Nino effects.

  ***- The South East Trade Winds and the "orographic effect"***

  Due to the heating in the equatorial region and the rotation of the earth, the winds in the tropical Pacific region generally move north-west-ward from the south east. The wind as it passes over the ocean picks up moisture and forms

clouds, markedly over landmasses, eventually forming and causing rain. For an island that has high mountains or a mountain range along its centre, for example the island of Vitilevu in Fiji, rain forming clouds would condense as rain on the south east part of the island. The result is the formation of two distinct rainfall regimes for this island, a wetter side (windward) and a drying side (leeward).

***- Tropical Cyclone***

Hurricanes are intense circular vortices with winds over 34 $ms^{-1}$ spiralling around a low pressure centre. The centre is small, calm and cloudless. Surrounding this is a band of convective clouds, usually twisted into a piled mass of cumulonimbus clouds through which air ascends in a spiral motion. When the air from each of these ascending regions reaches the tropopause, it moves outwards, creating a veil of cirrus, which may extend several hundred kilometres radially out from the hurricane centre. Hurricanes originate in the tropics and commonly increase in strength as they move pole-ward. Commonly the maximum intensity is reached as they cross into mid-latitudes. Generally their energy is rapidly dissipated once they leave the tropics.

The region of origin over the tropical oceans is restricted to latitudes between about 7 and 15$^{\circ}$ Equator-ward of 7$^{\circ}$ as the Coriol's force is too weak to initiate a circular motion, while pole-ward of 15$^{\circ}$ the sea-surface temperatures are too low. Sea-surface temperatures greater than $27^0$ C are required to ensure sufficient evaporation to provide the latent heat release within the storm needed to maintain its energy. In the Pacific region, it is usually from November to April that sufficiently high temperatures are achieved, creating a distinct hurricane season. (Contemporary Climatology, Peter J. Robinson & Ann Henderson-Sellers)

***- El Nino Southern Oscillation (ENSO)***

The following is a definition given by the IPCC 2007

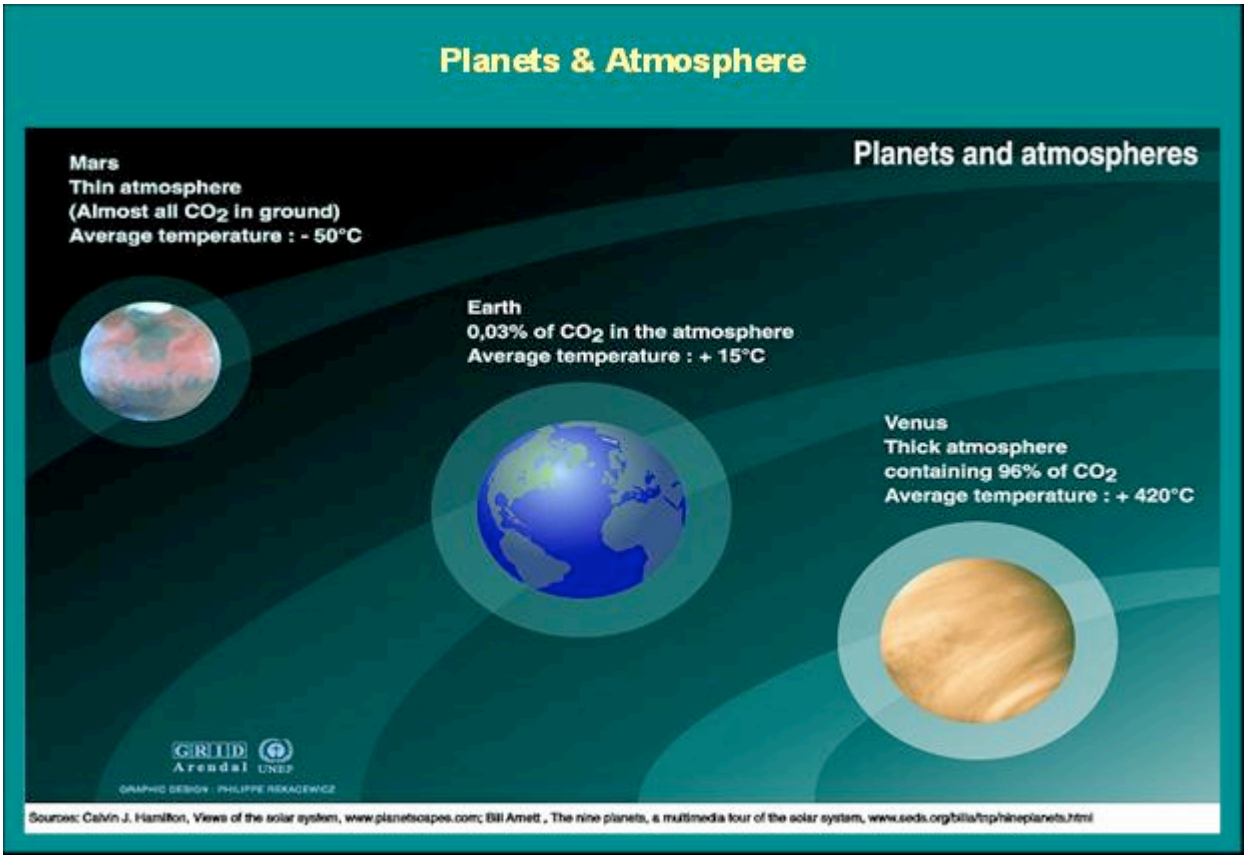
The term El Nino was initially used to describe a warm-water current that periodically flows along the coast of Ecuador and Peru, disrupting the local fisheries. It has since been identified as a basin-wide warming of the tropical Pacific Ocean east of the dateline. This oceanic event is associated with a fluctuation of a global-scale tropical and subtropical pressure pattern called the Southern Oscillation. This coupled atmosphere-ocean phenomena, with preferred time scales of two to about seven years, is collectively known as the El Nino-Southern Oscillation (ENSO). It is often measured by the surface pressure anomaly different between Darwin and Tahiti and the sea surface

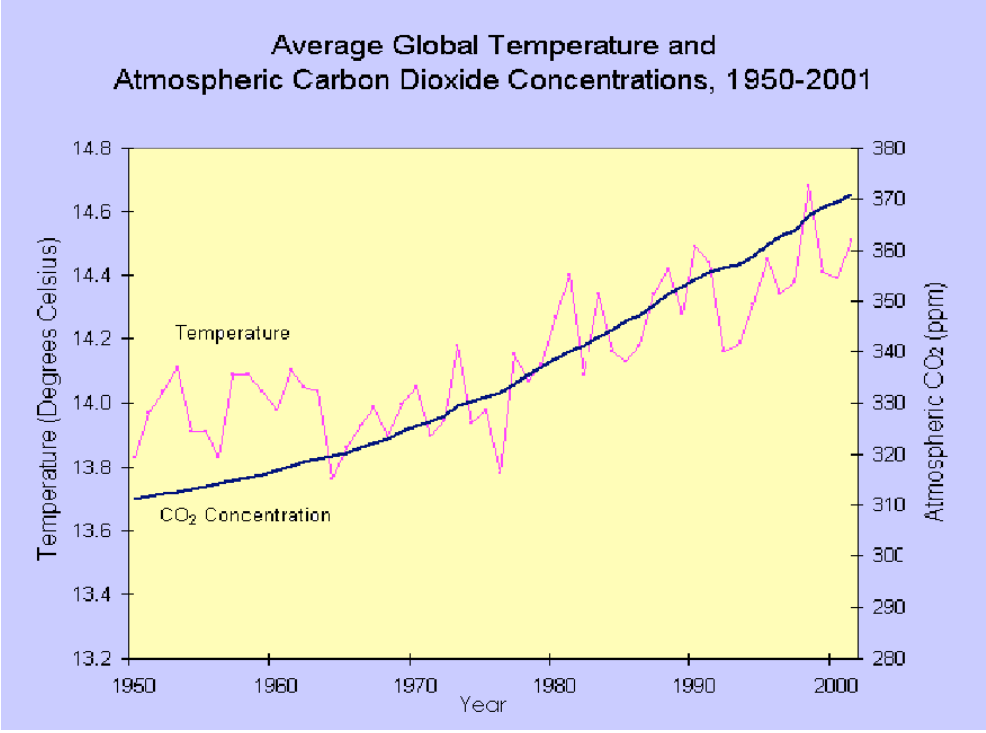
temperatures in the central and eastern equatorial Pacific. During an ENSO period, the prevailing trade winds weaken, reducing upwelling and altering ocean currents such that the sea surface temperatures warm, further weakening the trade winds. This event has a great impact on the wind, sea surface temperature and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific region and in many other parts of the world, through global teleconnections. The cold phase of ENSO is called La Nina.

- Describe the factors that affect the specific local community's climate:
  To understand the local community's climate and weather, the participants should first understand the determinant factors that influence the global, regional and national climates. At a national level, for example in Fiji, the annual determinant of the climate is the effect of the southeast trade winds. The local factors would then include:
  (1) The location of the village or settlement in relation to the southeast trade wind (windward or leeward side).
  (2) The surrounding topography.
  (3) Distance from the coast.
  (4) The altitude at which the village is located.
  (5) The surrounding vegetation.
  ➔ "Question and Answer Session"

**B. The science of climate change**

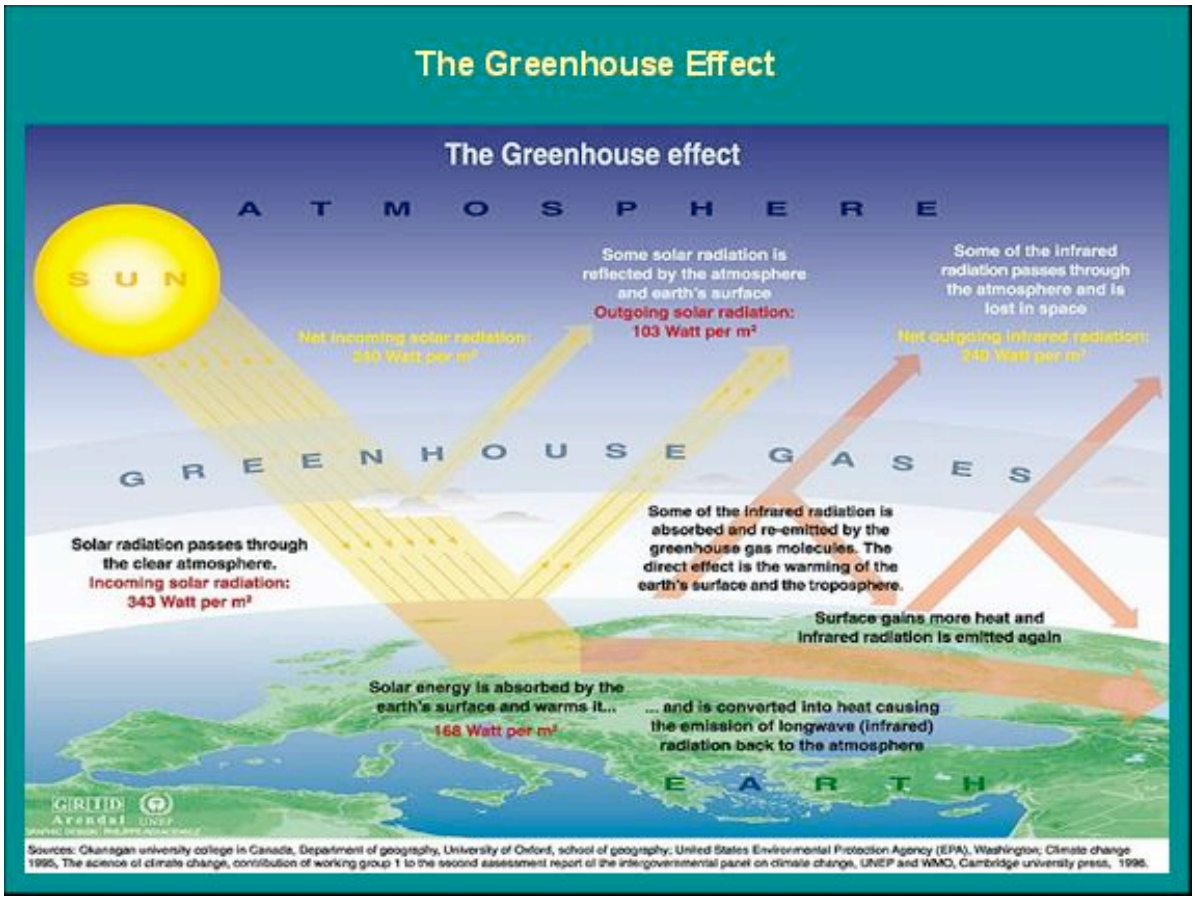
- Describe the solar system and radiation balance
  The earth's climate system is basically driven by the energy transformation within the earth/atmosphere system; the energy initially originating from the sun. The earth's climate system includes the wind, rain, clouds, humidity and temperature. The sun emits energy in the form of shortwave radiation. Part of the radiation is emitted back into space from the earth's reflectivity (albedo); some are absorbed into the ocean and land. The heated earth re-emits the energy back into space as long wave (infra-red) radiation. The incoming shortwave radiation is balanced by the outgoing radiation, thus globally on a long-term basis, radiation balance is maintained.


Planets & Atmosphere
Planets and atmospheres
Mars
Thin atmosphere
(Almost all $CO_2$ in ground)
Average temperature : - 50°C
Earth
0,03% of $CO_2$ in the atmosphere
Average temperature : + 15°C
Venus
Thick atmosphere
containing 96% of $CO_2$
Average temperature : + 420°C
GRID Arendal UNEP
Sources: Calvin J. Hamilton, Views of the solar system, www.planetscapes.com; Bill Arnett , The nine planets, a multimedia tour of the solar system, www.seds.org/billa/tnp/nineplanets.html


Average Global Temperature and
Atmospheric Carbon Dioxide Concentrations, 1950-2001
Temperature (Degrees Celsius)
Atmospheric $CO_2$ (ppm)
Year
Temperature
$CO_2$ Concentration
14.8
14.6
14.4
14.2
14.0
13.8
13.6
13.4
13.2
380
370
360
350
340
330
320
310
300
290
280
1950
1960
1970
1980
1990
2000

- Describe the "greenhouse effect":

  The earth's atmosphere is surrounded by a thin layer of gases, mainly carbon dioxide. This thin layer of gases maintains the earths mean surface temperatures of $15^0$ C. This occurs as a result of the greenhouse gases re-radiating back into the earth's surface and some of the outgoing radiation.




- Describe the "enhanced greenhouse effect" or global warming:

  The enhanced greenhouse effect or global warming occurs as a result of the thickening of the greenhouse gases in the atmosphere. Consequently more of the outgoing radiation is being reradiated back on the earth, resulting in a rise in global mean surface temperature. The thickening of the greenhouse gases in the atmosphere is the result of greenhouse gas emissions from human activities. The main anthropogenic (human induced) greenhouse gases (sources) are carbon dioxide (burning and fossil fuel combustion), nitrous oxide (industrial process and fuel combustion), and methane (anaerobic decomposition and enteric fermentation).

- Define climate variability and climate change

***- Climate variability***

According to the IPCC 2007 definition, climate variability refers to variations in the mean state and other statistics (such as standard deviation, the occurrence of extremes, etc.) regarding the climate on all spatial and temporal scales beyond that of individual weather influences.

***- Climate change***

According to the IPCC 2007 definition, climate change refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.

The Framework Convention on Climate Change (UNFCCC) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes.

- Describe the trends in carbon dioxide emissions, raising temperatures, and raising sea levels

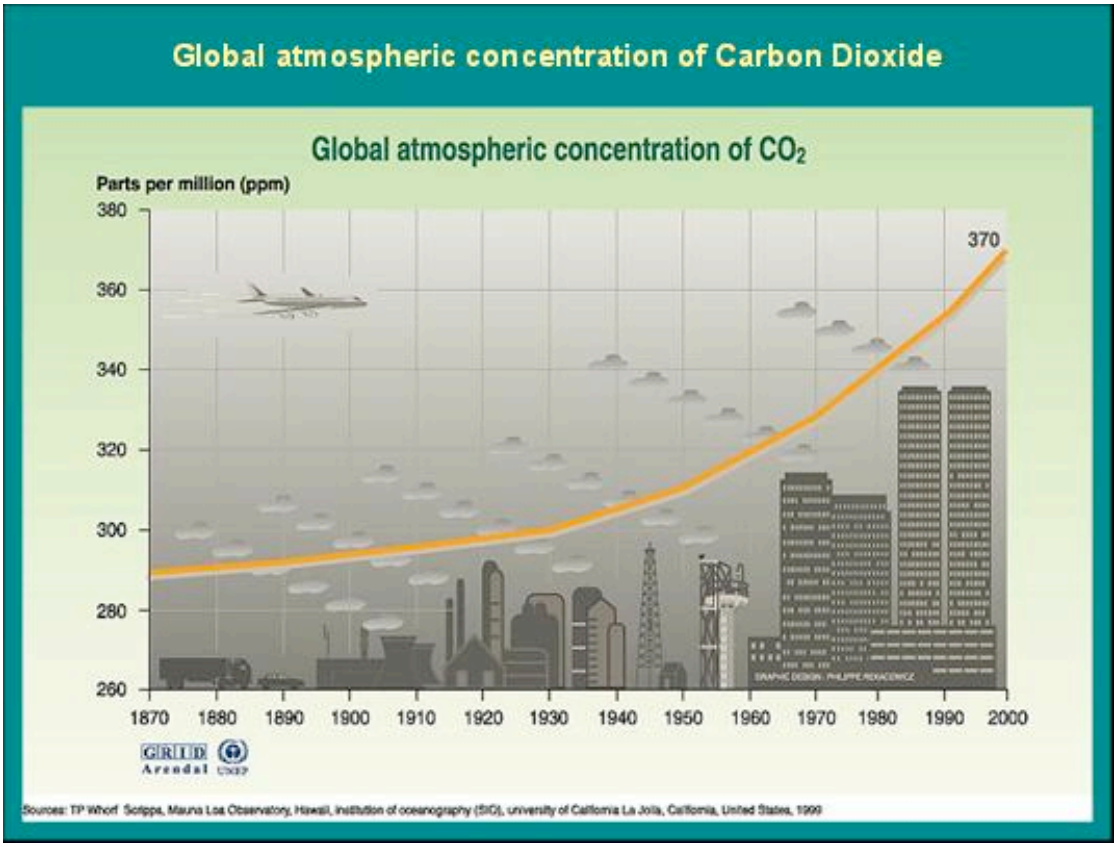
***-Green House Gas Emissions***

- According to the latest carbon emission figures, this continued to rise; fossil fuel combustion and cement production in 2008 was 8.7 Gt C, 41% higher than in 1990 (Kyoto Protocol base year).
- For the first time developing countries are now emitting more fossil fuel carbon dioxide emissions (55%) than developed countries. Capita emissions however continue to be led by developed countries by an ample margin.
- Tropical deforestation is responsible for about 1.5 Gt C per year, accounting for about 15% of the total anthropogenic carbon emissions.
- Carbon dioxide concentration in 2008 reached 385 ppm, 38% above pre-industrial levels.
- For the period 2000 – 2008, the growth rate of atmospheric carbon dioxide was 1.9 ppm per year, a significant growth increase from earlier trends (1.3 for 1970 – 1979, 1.6 for 1980 – 1989, and 1.5 for 1990 – 1999).

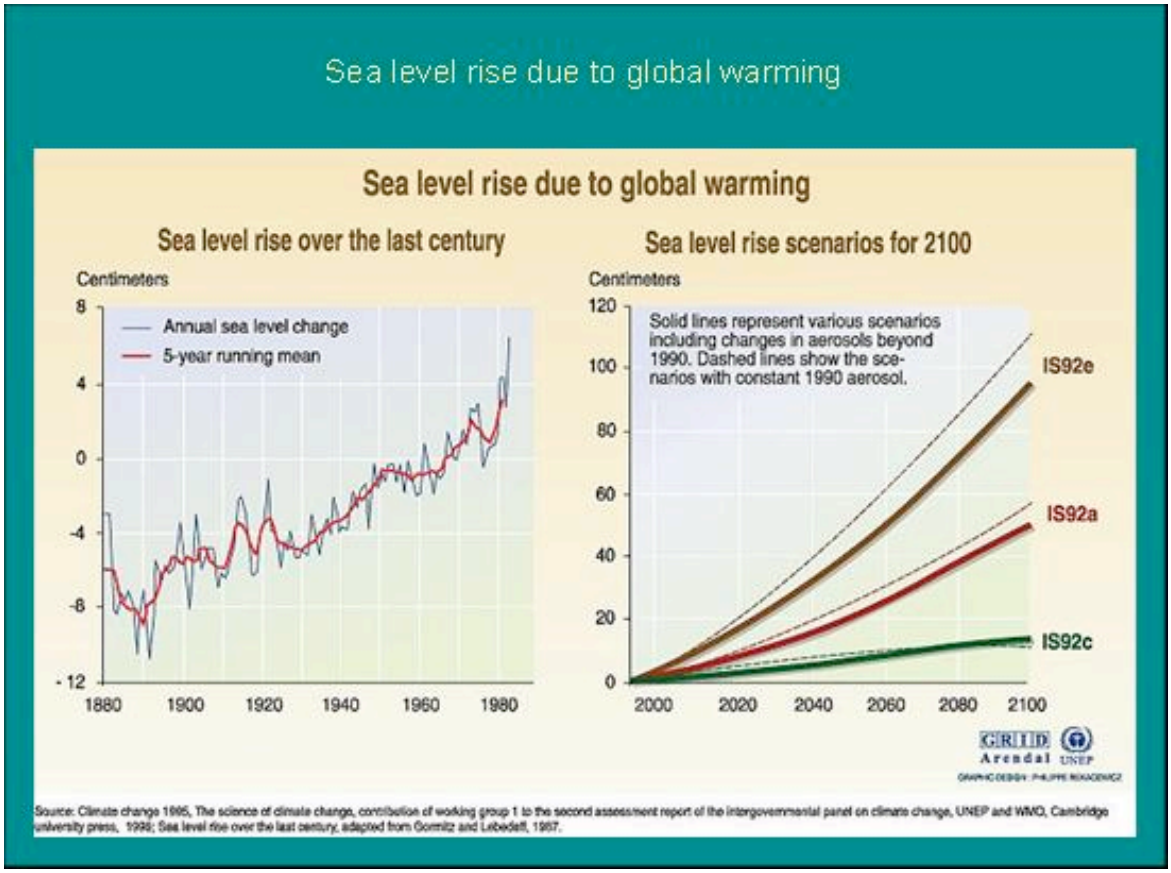
- ***Carbon Futures***
  - The world's energy demands are expected to rise by 50% by 2030, and unless major changes are implemented rapidly, 80% of that increase will depend on fossil fuels (oil, gas and coal).
  - If current trends prevail, global fossil fuel emissions are expected to rise to between 12 and 18 Gt C per year by 2050 (2 to 3 times the level in 2000).

- ***Temperature***

  According to the IPCC Report 2007 for the Pacific Island Region:
  - Global mean surface temperature has risen by approx. 0.74° C over the last 100 years.
  - For the Pacific Islands region, the mean temperature has increased by 0.6 to 1.0° C since 1910.
  - Trends in extreme temperatures across the Pacific Island region show an increasing number of hot days.



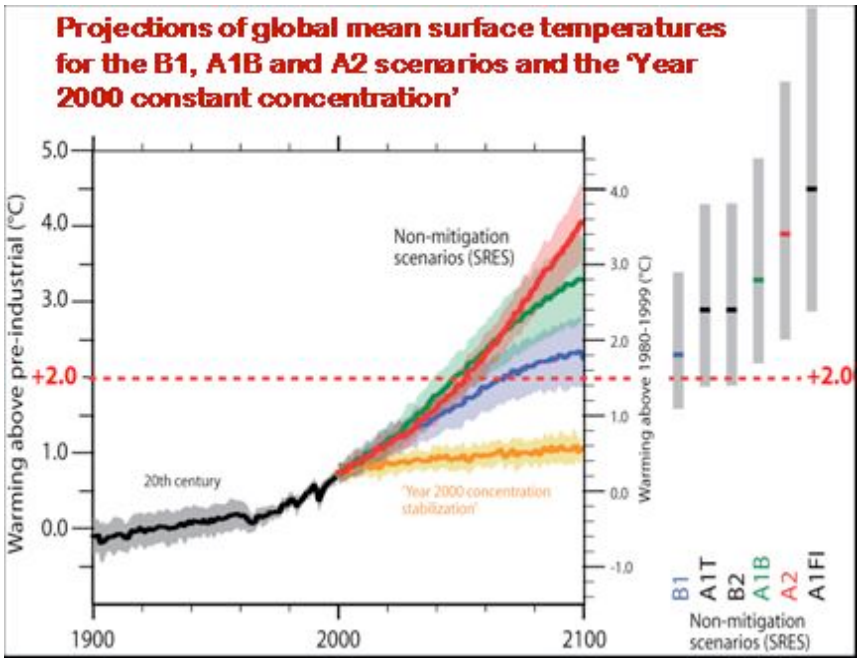
- ***Sea Level***
  - Sea levels in the Pacific Island region have risen at an average rate of 1.6 mm/yr over the last 50 years.
  - By the end of this century, the IPCC projects that the global average sea levels will rise by 0.19 to 0.58m above the 1980-1999 baseline.
  - However, these projections do not account for the true extent of melting icecaps and may therefore grossly underestimate potential rising sea levels over the coming century, which could rise by more than 1 m.




- Define emissions scenarios and climate projections:

  According to the IPCC 2007 report/statement, emission scenarios are a plausible representation for the future development of emissions in substances that are potentially radiatively active (e.g., greenhouse gases, aerosols), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socioeconomic development, technological change) and their key relationship.

Concentration scenarios, derived from emission scenarios, are used as inputs for a climate model to compute climate projections.

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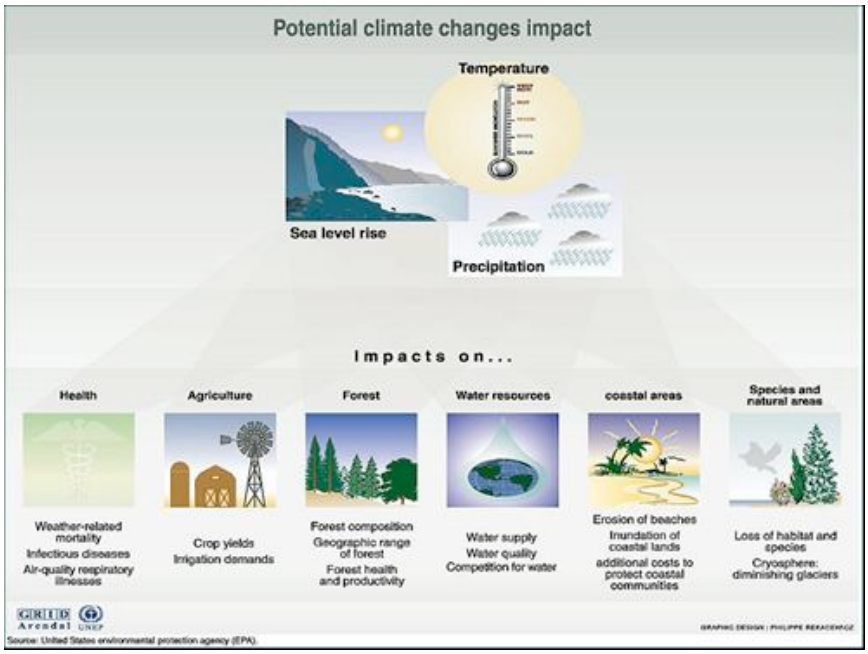
## C. The possible impacts of climate change

- Describe the possible impacts at a global level:

  On a global scale, the rise in temperature would have an effect on the global climate systems. In general, climate change would have adverse impacts on the human and biophysical systems, such as health, agriculture, hydrological cycle and water resources, coastal areas, fisheries and the ocean resources, and biodiversity. The rise in temperature would result in the melting of ice caps and glaciers in the Polar Regions, resulting in rising sea levels. The rise in temperature would also result in the heating up of oceans; this would cause thermal expansion, further contributing to rising sea levels.



- Describe the possible impacts at the regional and national levels:

| Change | Problem |
|---|---|
| Increased climate variability | Variable agricultural productivity<br>Variable water supply |
| More climate extremes<br>- Tropical cyclones<br><br><br>- Drought | <br>Increased infrastructure/building damage<br>Increased damage to cash crops<br>Increased damage to subsistence food sources<br>Decreased/variable food supply<br>Decreased water supply<br>Decreased yields of cash and subsistence crops<br>Decreased livestock feed<br>Increase water-borne diseases |
| Temperature rise | Decreased productivity of key crops<br>Increased coral-reef bleaching<br>Increased vector-borne diseases |
| Carbon dioxide increase | Ocean acidification |
| Raising sea-levels | Coastal inundation<br>Shoreline erosion (& consequent near shore sediment mobilisation)<br>Groundwater salinisation in coastal lowlands<br>Larger waves able to cross reefs and reach island shorelines |

*(Nunn, Clim Res 40:211-231, 2009)*

- Describe the possible impacts at a local level:

  Note: put up the table in (b) and go through the list of impacts with the community and contextualise it by deleting what are not immediately relevant and adding those impacts which are of relevance for the community level.

  ➔ "Question and Answer Session"

**Step 3**: Describe what "scientists" and "leaders" are doing about climate change

- Describe what the "leaders" are doing at an international level:

  World leaders adopted the United Nations Framework Convention on Climate Change (UNFCCC) on 9 May 1992 in New York and signed the declaration at the 1992 Earth Summit in Rio de Janeiro witnessed by more than 150 countries and the European Community. Its ultimate objective is the 'stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. It contains commitments made by all Parties.

  Countries ratifying the Convention – called "Parties to the Convention" agree to take climate change into account in such matters as agriculture, energy, natural resources, and activities involving seacoasts. They agree to develop national programmes to slow down climate change. The Convention encourages them to share technology and to cooperate in other ways to reduce greenhouse gas emissions, especially from energy, transport, industry, agriculture, forestry, and

waste management, which together produce nearly all greenhouse gas emissions attributable to human activity.

The countries, which are Party to the Convention, are required to submit national reports to the convention secretariat on their level of greenhouse gas emissions, measures taken to mitigate the emissions and adaptation measures taken to address the impacts of climate change.

The Kyoto Protocol for the UNFCCC was adopted in 1997 in Kyoto, Japan, at the Third Session of the Conference by the Parties (COP) for the UNFCCC. It contains legally binding commitments by Annex 1 countries. (Annex 1 countries are developed countries, which are party to the convention) The Kyoto Protocol entered into force on 16 February 2005.

- Describe what the "scientists" are doing at an international level:
  The Intergovernmental Panel on Climate Change is the leading body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO) to provide the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.

  The IPCC is a scientific body. It reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters. Thousands of scientists from all over the world contribute to the work of the IPCC on a voluntary basis. Review is an essential part of the IPCC process, to ensure an objective and for the complete assessment of current information. Differing viewpoints existing within the scientific community are reflected in the IPCC reports.

  The IPCC is an intergovernmental body, and it is open to all member countries of the UN and WMO. Governments are involved in the IPCC work as they can participate in the review process and in the IPCC plenary sessions, where main decisions about the IPCC work programmes are taken and reports are accepted, adopted and approved. The IPCC Bureau and Chairperson are also elected in the plenary sessions.

  Because of its scientific and intergovernmental nature, the IPCC embodies a unique opportunity to provide rigorous and balanced scientific information for decision makers. By endorsing the IPCC reports, governments acknowledge the authority of

their scientific content. The work of the organisation is therefore policy-relevant and yet policy-neutral, never policy-prescriptive.

- Describe what the "leaders are doing at a regional level:
  In 2005 the leaders endorsed the Pacific Islands Framework for Action on Climate Change 2006 – 2015. The framework's goal is to ensure that Pacific Island peoples and communities build their capacity to be resilient to the risks and impacts of climate change. The six principles of the framework are:
    (1) Implementing adaptation measures.
    (2) Governance and decision making.
    (3) Improving our understanding of climate change.
    (4) Education, training and awareness.
    (5) Contributing to global greenhouse gas reduction.
    (6) Partnership and cooperation.

- Describe what the "scientists' are doing at a regional level:
  Funding from donors such as AusAID, and working in collaboration with eternal research institutes and networks, the Pacific region has strengthened its capacity for developing observation systems such as those carried out by Global Climate Observing Systems (GCOS), the Global Ocean Observing System (GOOS), the Global Terrestrial Observing System, and the Global Atmospheric Watch network of observations. A component of GOOS is the Global Sea level Observing System (GLOSS). The main aim of GLOSS is the establishment of a global network of 287 sea-level stations around the world, for long-term climate change and sea- level monitoring. For the Pacific, since 1991, high-resolution sea level gauges and associated monitoring equipment have been deployed and are operating in 12 Pacific island countries.

- Describe what the 'leaders' are doing at a national level:
  - Fiji submitted its First National Communication device in 2005 and work begun in the compilation of a second national communication device in 2010.
  - In 2010 the Department of Environment instituted the Climate Change Country Team (CCCT). The CCCT will guide and advice the Government in matters related to climate change.
  - The Fiji Climate Change Policy was developed in 2003 and was passed through Cabinet on the 30th November 2007.The policy covers the following areas:
    (1) Mainstreaming of climate change issues.
    (2) To improve climate change data collection, storage and sharing.
    (3) To promote awareness and understanding of climate change.
    (4) To implement adaptation action.

(5) To implement mitigation measures.

(6) To ensure Government commitments to regional and international instruments are maintained.

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**Step 4**: Identify and describe the challenges and opportunities in addressing climate change

**A. Challenges**

- Existence of social and economic pressures - These include: (i) population growth; (ii) unequal access to resources; (iii) unemployment; (iv) prevalence of lifestyle diseases; (v) increasing energy/fuel costs; (vii) poor leadership; (viii) corruption; (ix) conflict; (x) in and out-migration; (xi) international trade barriers; (xii) increasing cost of goods and services; and (xiii) western influence – especially on the younger generation.

The adverse impacts of climate change would be an additional burden to the community to bear.

- Most of the future impacts can only be estimated.
  Most leaders are not overly keen in financing adaptation measures, which are based on assumptions regarding the level of $CO_2$ emissions, which may or may not be realised.
- Resource allocation from governments and donors may not be adequate.
  Though it is commendable of developed countries to provide assistance to the Pacific region, the level of funding is in no way near what is required to ensure the Pacific Island communities can adequately address the adverse impacts of the current climate and climate change.
- Unsustainable development pathways continue to be followed by governments and communities.
  Communities and national governments continue to follow unsustainable development pathways. The symptoms of unsustainable development include: increasing pollution of land, waterways and marine/coastal areas, increasing unemployment rates, increasing lifestyle diseases; increase in prostitution; corruption, unstable governments; Etc.
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**B. Opportunities**

- Opportunity for community to understand global, national and local socio-economic pressures.
  The pressures and drivers of change are important concepts, which the community should understand. Ignorance of the facts would not assist the

community in choosing an alternative development pathway, which may ensure that sustainable development is achieved.

- Review of current socio-economic programmes in the community and an evaluation of their level of sustainability.

  Discussing the climate change issue will invariably bring about the evaluation of current socio-economic programmes and flag which ones should be considered as mal-adaptation and which ones support or complement adaptation and sustainable development.

- Formulation of a community sustainable development plan.

  The lasting solution for the world and for the community to address climate change is sustainable development. We (the global community) have created the "mess" we now find ourselves in because of following unsustainable development pathways.

- Funding for Climate change programmes and activities can provide the opportunity, initiate and catalyse "sustainable" community development.

  In order to capitalise on funding provided through climate change assistance programmes, Pacific Island governments and communities need to act smart and create a plan to mobilise activities that are strategic; these are adaptation plans that address both climate change and facilitate sustainable development.

**Step 5**: Using the PACE-SD Strategic Adaptation Framework to address climate change

- Define and describe the term 'strategy' and 'framework'

  (1) Define Strategy

  Alternative chosen to "make happen" a desired future, such as achievement of a goal or solution to a problem.

  As James Brian Quinn indicated in *The Strategy Process: Concepts and Contexts,* "a strategy is the pattern or plan that integrates an organisation's major goals, policies, and action sequences into a cohesive whole. A well-formulated strategy helps to marshal and allocate an organisation's resources into a unique and viable posture based on its relative internal competencies and shortcomings, anticipated changes in the environment, and contingent moves by intelligent opponents." (Mintzberg, Henry, and James Brian Quinn. *The Strategy Process: Concepts and Contexts.* Prentice-Hall, 1992.)

  (2) Define Framework

  A set of assumptions, concepts, values, and practices captured in a conceptual structure or frame that constitutes a way of viewing reality.

- Why do we need a strategy?

All projects, particulary complex ones such as addressing climate change needs a strategy in order to be successful; otherwise the effort and resources will be spent haphazardly and likely wasted.

Specifically a strategy is needed for the following reasons:

- Climate change has a wide and far reaching impact and is long term
- Resources are scarce
- Projects need to be self-sustaining or evolve from a project to a programme
- Enhances internal and external evaluation of climate change adaptation projects in a systematic way
- Incorporates DRM, sustainable natural resources management, mitigation and promotes the adoption of sustainable development pathways

- Describe the PACE-SD Strategic Adaptation Framework

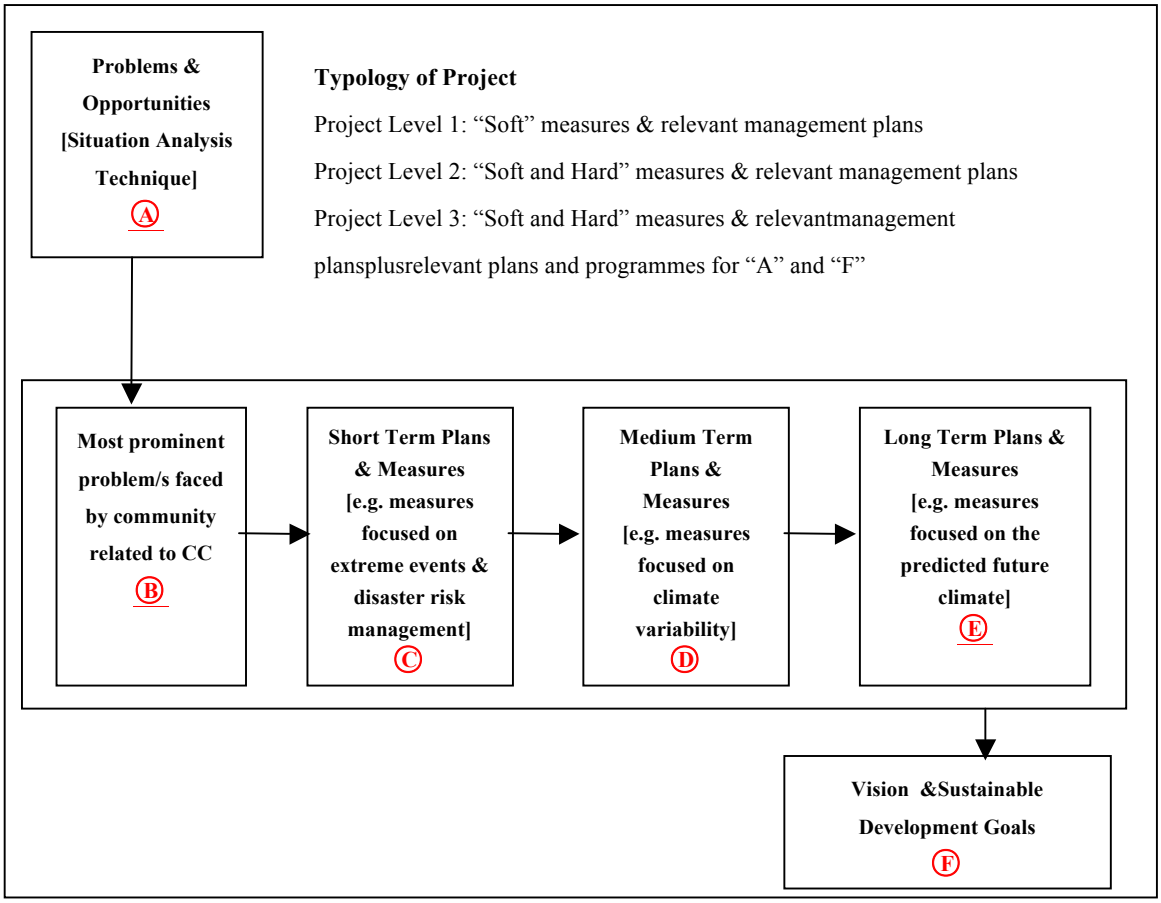

Figure 1: The PACE-SD Strategic Adaptation Framework

The adaptation framework is strategic in three ways. First, the assessment and plans are based on a firm understanding of the current socio-economic, cultural and environmental problems faced by the community. Secondly, it addresses

critical problems related to climate change currently faced by the community, before sequentially addressing other aspects of climate change within the short, medium and long term. In the context of climate change, these three time frames neatly correspond to climate extremes, climate variability, and climate change. Thirdly, it sets in motion a process that would initiate and catalyse community action that would enable them to develop in a sustainable manner.

In addition to sequentially addressing the various aspects of climate change, projects are also categorised into a three-tier project classification system, viz. project level 1, 2 and 3. Within the strategic adaptation framework, project level one would mainly focus on soft measures for communities to follow to address issues under A to F, (see Figure 1). Project level two would focus on soft measures related to issues under A to F and discrete measures related to issues under B to E. Level three would focus on both soft and discrete measures related to issues under A to F. This will also involve initiatives that address sustainable development challenges of village communities.

Furthermore, within the framework there is scope for addressing other pressing environmental issues. For instance, the entry points for addressing biodiversity under the United Nations Convention on Biodiversity (UNCBD) and land degradation under the United Nations Convention to Combat Desertification (UNCCD) are represented by C, D & E (Figure 1).

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**Step 6**: Using the PACE-SD Project Cycle to plan and schedule the adaptation project

- Define and describe the term "project cycle"
- The Project Life Cycle refers to a logical sequence of activities to accomplish the project's goals or objectives
- Why do we need a project cycle

  Project activities must be grouped into phases because by doing so, the project manager and the core team can efficiently plan and organise resources for each activity, and also objectively measure achievement of goals and justify their decisions to move ahead, correct, or terminate.
- Describe the PACE-SD project cycle

  The PACE-SD methodology employs a seven-step project cycle, (Figure 2) which forms the basis of developing and implementing an adaptation project. The objectives and expected outputs of each component are shown in Table 1. Through an integrated and consultative process the vulnerability and adaptive capacity of the community and the adaptation options for the community are identified and assessed. The selected adaptation options are

then implemented with community participation. The progress of the project is continuously monitored and evaluated using specific indicators for the time horizons - short, mid and long-term.

Figure 2: Steps in the project cycle

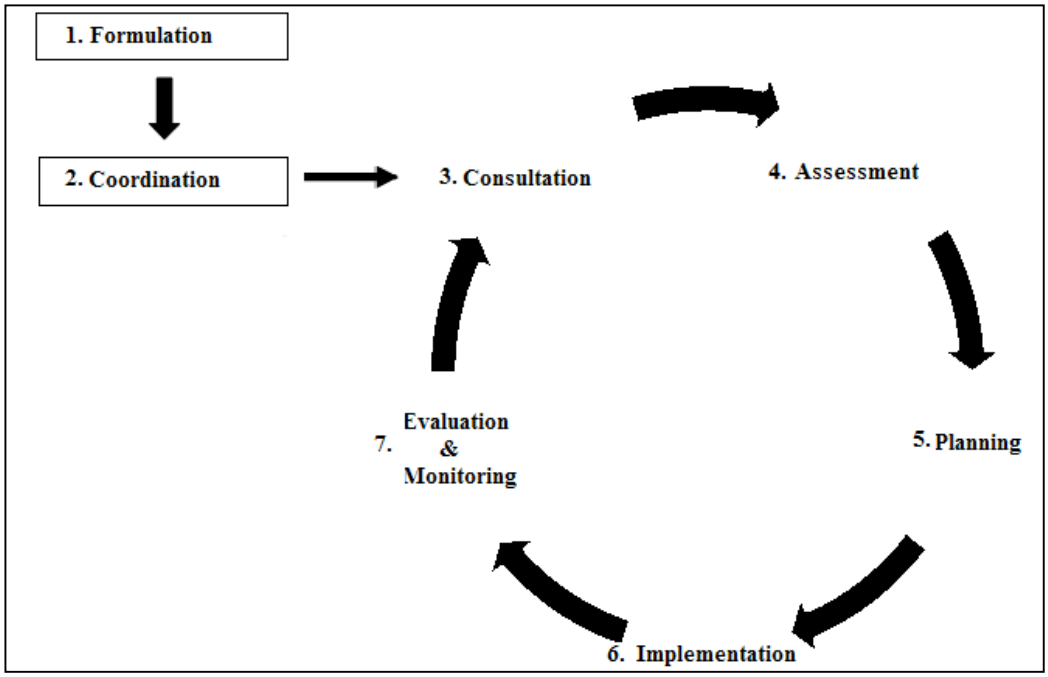



Table 1: Objectives of each of the seven steps of the integrated methodology

| **Steps** | **Objectives/Outputs** |
|---|---|
| 1. Formulation | Defines project objectives, policy context, scope & design. |
| 2. Coordination | Administrative, financial and secretarial support set-up, facilitator, advisory & technical team set-up, the rules of engagement & Terms of References (TOR's) and, overall coordination. |
| 3. Consultation | Initial advisory team & community consultations, site screening & selection. Raising awareness on climate change, natural disasters, sustainable development and other relevant issues. |
| 4. Assessment | Vulnerability & Adaptation Assessment (V&A). Identification & selection of adaptation option/s. |
| 5. Planning | Development of implementation plans; stakeholder consultation & community endorsement of implementation plans. Formulation & endorsement of community vision & sustainable development plan |
| 6. Implementation | Implementation of endorsed adaptation plan. Implementation of sustainable development plan (depends on availability of resources) |
| 7. Monitoring & Evaluation | Evaluation of the major stages of the project and monitoring the effectiveness of the implemented adaptation measures. |

➔ "Question and Answer Session"

**Step 7**: Using the PACE-SD Procedural Framework to mobilise community and technical experts to assess vulnerability and plan, implement and monitor the adaptation activities

- Define and describe the term “procedure”

  A procedure is a specified series of actions or operations, which have to be executed in the same manner in order to always, obtain the same result under the same circumstances. It also indicates a sequence of tasks, steps, decisions, calculations and processes, that when undertaken in the sequence laid down produces the described result, product or outcome.

- Why do we need the PACE-SD Procedural Framework

  It not only indicates the sequence of a task, more importantly it ensures the full participation of community members in the assessment, planning, implementation, evaluation and monitoring processes. This will facilitate effective capacity building for the community in addressing climate change.

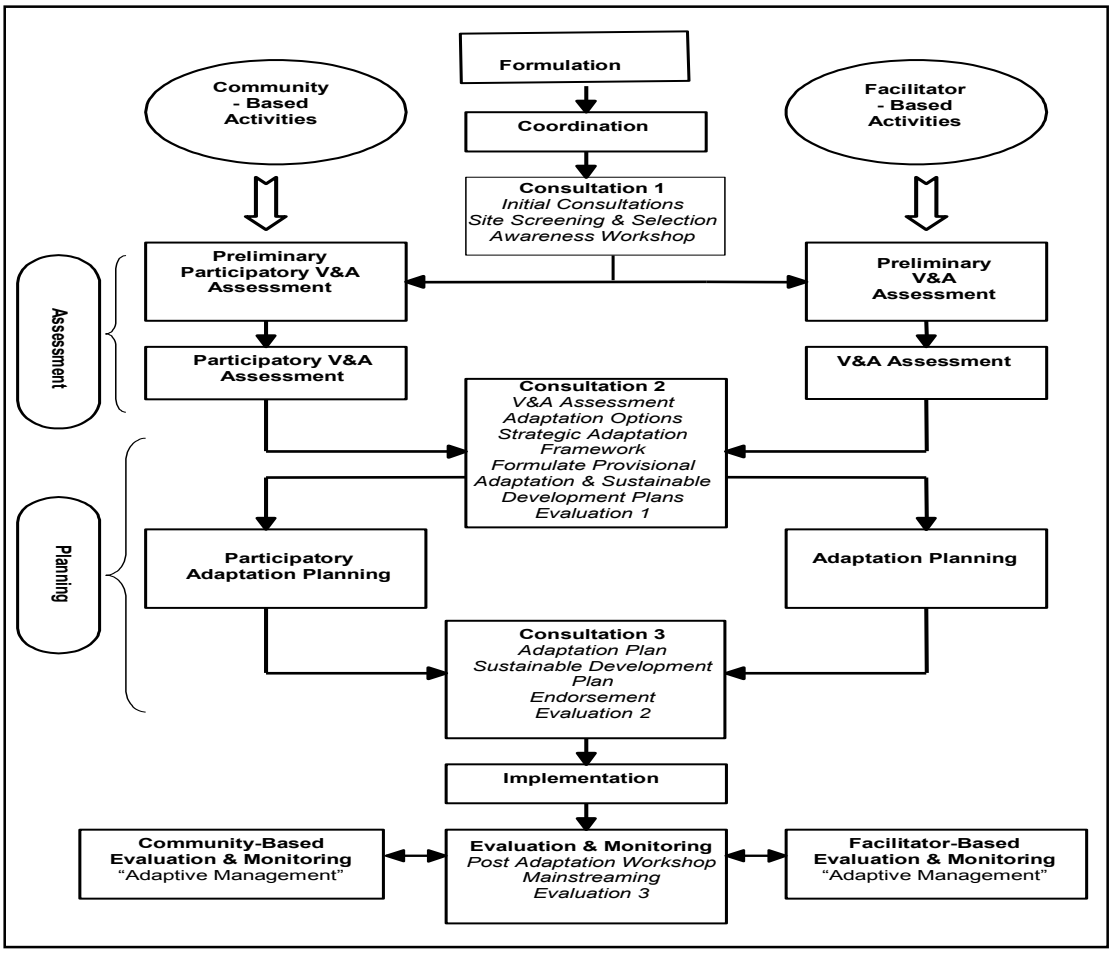
- Describe the PACE-SD Procedural Framework

  The procedural framework links the other two components together and more importantly represents a departure from typical V&A methods applied so far in PICs. The premise of departure is a two-pronged approach with a strong and equal emphasis on (i) community-based approaches using participatory tools and (ii) facilitator-based approaches using technological/scientific tools and methods to assess vulnerability and adaptation options.

  After Consultation 1, the method is divided into two separate but interconnected streams of activities. As depicted in the procedural framework, the left portion denotes community-based activities whilst the right portion denotes facilitator-based activities.

  Two main consultation forums, namely consultation 2 and consultation 3, link these activities. The main purpose of the consultations is for the presentation of findings, discussion of V&A assessment and for the endorsement of adaptation plans. It should be noted that depending on the circumstances on the ground, the activities of both streams could be merged onwards from consultation 2. In this way the community understanding of what is happening and their ownership of the process are enhanced. This will ensure that the required community capacity is developed to continue the formulated adaptation programme even beyond the lifetime of the externally funded project.

Figure 2: Procedural framework




➔ "Question and Answer Session"

**Step 8**: Preparation of community vision, sustainable development plan, and climate change adaptation plan

**A. Vision and Sustainable Development Plan**

- Define the term vision

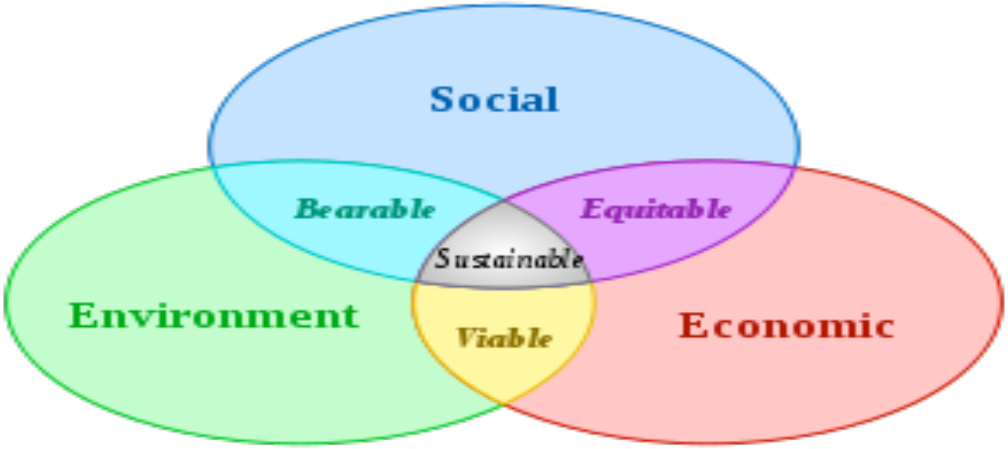
  The term "vision" is a mental picture of what the community ideally would desire to be in the future. Visions provide a sense of direction in the long term -- they provide the means to the future.

- Define the term 'sustainable development'

  The term was used by the Brundtland Commission, which coined what has become the most often-quoted definition of sustainable development as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs.

(Reference: UnitedNations. 1987."Report of the World Commission on Environment and Development." General Assembly Resolution 42/187, 11 December 1987.)

The field of sustainable development can be conceptually broken into three constituent parts: environmental sustainability, economic sustainability and socio-political sustainability.




**【Scheme of sustainable development: at the confluence of three constituent parts】**

(Adams, W.M. (2006). "The Future of Sustainability: Re-thinking Environment and Development in the Twenty-first Century.")
(http://cmsdata.iucn.org/downloads/iucn_future_of_sustanability.pdf)

- How to prepare a community vision

  A vision statement describes a future desired state that embraces social, environmental and economic ideals. An effective vision is: inspiring; clear and challenging; makes sense and is executable.

- How to prepare a community sustainable development plan

  **Step 1**. Setting the vision is the fist step in formulating a community sustainable development plan.

  **Step 2**.The second step involves establishing goals, with the active participation of the community.

  **Step 3**. The third step is defining the objectives, again with the active participation of the community. Definable objectives provide a way of measuring and evaluating progress toward vision achievement.

  **Step 4**. The fourth step is to determine tasks. Through tasks, objectives are accomplished. Tasks are concrete, measurable events that must occur.

**Step 5**. The fifth step is to establish a priority for the tasks. Since time is precious and many tasks must be accomplished before another can begin, establishing priorities helps the community to determine the order in which the tasks must be accomplished and by what date.

**Step 6**. The final step is to follow up, measure, and check to see if the community is doing what is required.

**B. Climate change strategic adaptation plan**

- How to prepare a community strategic climate change adaptation plan

  The PACE-SD Strategic Adaptation Framework will be used to guide the community strategic climate change adaptation plan.

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  ➔ "Working Group Session"

**Step 9**: The way forward – where to start and what to do?

- Review and obtain endorsement for the Community Vision (First Draft)
- Review and obtain endorsement for the Community Sustainable Development Plan (First Draft)
- Review and obtain endorsement for the Community Climate Change Strategic Adaptation Plan (First Draft)
- How to start from the endorsed plans
- How to seek government and external (donor) assistance

**Step 10**: Evaluation of the education and training programmes

- Evaluation questionnaire
- Reflections on the course with respect to the objectives, expected outputs and expected outcomes - comments from participants and open discussions
- Concluding remarks from the community representative or leader
- Concluding remarks from the Course Coordinator

**- End of the Training Course-**

## 2.5 ANNEX 1: PARTICIPANT AWARENESS HANDOUT ON CLIMATECHANGE

## NA VEISAU NI DRAKI KEI IKO

### Na duiduini "climate" kei na "weather"

Na vosa vakavavalagi na "weather" se "climate" edau vakadewataki kina vosa vakaviti me draki, ia ena kena vakanananu taumada, oqo e rua na vosa ka duidui na kena ibalebale. Na ibalabale ni "weather" oya na draki ka tarai keda ena veisiga. Me vaka, e na noa e draki vinaka, ia nikua e draki ca se tau tiko na uca. Ia na ibalabale ni "climate", oya na vakarau ni draki ena dua na vanua ni loma ni vica sagavulu na yabaki. Na "Climate Change" oya na veisau ni vakarau ni draki ("climate") ena dua na vanua.

E dau qai kune na veisau ni draki oqo oya ni vakadikevi na veisau ni vakarau ni katakata ena dua na gauna balavu sara, me vaka ena loma ni tini se dua na drau na yabaki. Na iyaloyalo se droini e koto e ra oqo e vakaraitaka tatiko ni tauri vata kece na vakarau ni katakata ni noda vuravura ena maliwa ni yabaki 1990 ki na 2000 e laurai ni sa toso cake se tubu kina veimama ni dikiri me vakatautauvatataki kei na yabaki 1940 ki na 1950. Veikeda eke i Viti e sa vakilai tale tiko ga na tubu cake ni vakarau ni katakata. Ni kua ena so na siga na vakarau ni katakata sa yaco vatiko yani na 35 se 36 na dikiri. E liu na katakata e yacova tiko ga na 33 se 34 na dikiri.

Mai vei ira na daunivakadidike, era nanuma ni na tubu cake na ivakarau ni katakata ena 0.2 diqiri ena vei tini na yabaki. Oya e sa na toso cake ena rua na diqiri na vakarau ni katakata ni da na yacova yani na yabaki 2100.

Na tubu cake ni vakarau ni katakata e vakatokai tiko me "global warming"
Oqo na veika ka sa vakadikevi tiko ni na basika ena noda vuravura mai na revurevu ni global warming:

- E sa tubu cake na katakata ni waitui kei na cagi i vanua;
- E levu na waicevata ena vei vanua era sa wai cala vakamalua tiko;
- Ena tubu na cerecere ni wasawasa (sea level rise) mai na katakata ni wai kei na wai cala ni waicevata.

### Na cava e vuna na veisau ni draki?

E so na kasi (mataqalicagi) ka ologa tu na noda vuravura ena maliwa lala e ra dau maroroya na katakata ni mata ni siga. Era vakatokai na vei kasi oqo me ra "greenhouse gases", ka dua vei ira e bibi duadua oya na "carbon dioxide" (oqo na mataqali cagi da cegu vata ni ena noda cegu tiko ena veisiga). Na kasi oqo e dau basika ni dau vaka mai e dua na ka.

Ena gauna e liu, na levu ni carbon dioxide ena macawa e a tiko ga ena 180-300 ppm. Ni tekivu na gauna ni buli yaya kei na misini (ka vakayagataki vakalevu na vaka mai ni waiwai kei na koala) sa

kunei ni tubu cake tale ga na levu ni carbon dioxide ka sa yacova sara na 380 ppm e na gauna oqo, se e dua na tubu ni limasagavulu na pasedi.

## Eso tale na revurevu ni veisau ni draki ka na yacovi keda?

Era nanuma na dauvakadidike ni na so tale na revurevu ni veisau ni draki eda na sotava me vaka:

- Ena toso cake na ivakarau ni katakata ena siga kei na bogi
- Ena yacova ka wasoma na gauna ni katakata sivia sara (heat wave)
- Ena levu tale na gauna ni tau bi sara na uca
- Ena levu cake na gauna ni draki mamaca sara se lauqa (drought)
- Ena tubu cake na iwiliwili kei na kaukauwa ni cagilaba
- Ena tubu cake na iwiliwili ni cabe ni ua loka (storm surge)

## Na cava na revurevu ni veisau ni draki ena kauta mai veikeda?

Na veisau ni draki ena tara na noda bula, na noda i teitei, na veikau, na vurevure ni me da wainigunu, na bula ni noda veicakau kei na matasawa**.**

Na veivakatorocaketaki oqo (CCA Project) e vakagolei vakatabakidua kina kena vueti na noda ivurevure ni wainigunu, kei na taqomaki ni noda cakau kei na matasawa.

【Na wainigunu】

- Ena gauna ni draki mamaca, era rawa ni maca na veiuciwai lalai, ka mamaca tale ga na wai ena loma ni qele
- Ena levu na vakacaca ni paipo ni levu na waluvu.

【Na cakau kei na matasawa】

- Ni katakata na wasawasa e rawa ni mate na lase (ena veisau na kena roka me vulavula – "coral bleaching") Ena yabaki 2000, ena vula ikatakata, voleka ni veimama na lase a veisau me vulavula)
- Era na malumalumu na lase ni tubucake nai vakarau ni "carbon dioxide" ena loma ni wasawasa.
- Na ua ena kania na matasawa (coastal erosion) ni tubu cake na ivakarau ni wasawasa. E levu na vanua e Viti, na iyalayala ni matasawa e liu sa vicasagavulu na mita i wai.
- Na noda veitiri era na lailai mai ni tubu cake na cerecere ni wasawasa
- Na cakau era na vakaleqai ni levu tale mai na uca kei na cagilaba.

E dina ni na kauta mai eso na veileqa lelevu ka na tara na noda iyau bula na veisau ni draki, ia ena cala meda na beitaka vakatabakidua na leqa oqo ena revurevu ni veisau ni draki. E so na leqa ka toka e cake oqo e rawa ni vakavuna tale ga na qoli vakasivia, na ta kau vakaveitalia, na benu vakacakei na veivakatorocaketaki e sega ni lewai matau na vakayagataki ni noda veibaravi. Na revurevu ni veisau ni draki ena mai kuria ga na veileqa eda sa tu rawa ena noda iyau bula.

## Me da vakavakarau kei na tataqomaki mai na reverevu ni veisau ni draki

Na vakavakarau ki na revurevu ni veisau ni draki e dodonu me ciqomi me mai tiki ni noda tuvatuva ni veisiga kei na veivakatorocaketaki ni noda itikotiko. Oya e okati kina na noda vulica na ulutaga ni veisau ni draki, noda vaqara na iwali uasivi duadua, noda vakatovolea na veiiwali eso, noda vuli mai na veivakatovotovo eda cakava, ka kuria na veiiwali vovou oqo kina noda veituvatuva.

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