

Climate change and related statistics



Workshop on Environment Statistics for the East African
Community (EAC) Region, Arusha, Tanzania,
23-27 October 2017



Contents

- Understanding climate change
- Climate change agreements
- Climate change reporting
- How can statistics on environment, climate change and others help in reporting

Understanding climate change

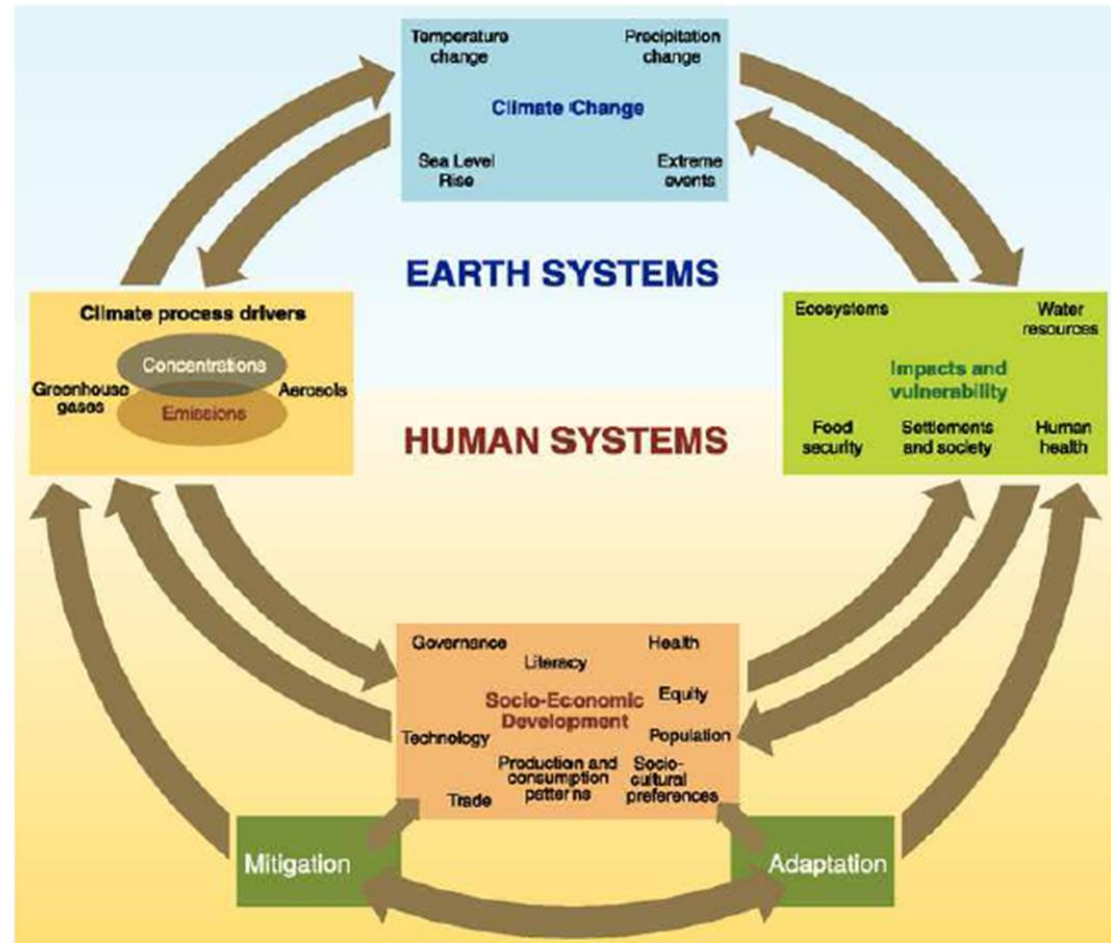
- CC Refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). (IPCC TAR, 2001)
- A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere - variability observed over comparable time periods (UNFCCC Article 1)
- The climate of a place or region is changed if over an extended period (typically decades or longer) there is a statistically significant change in measurements of either the mean state or variability of the climate for that place or region. (UN/ISDR, 2004)



Understanding climate change

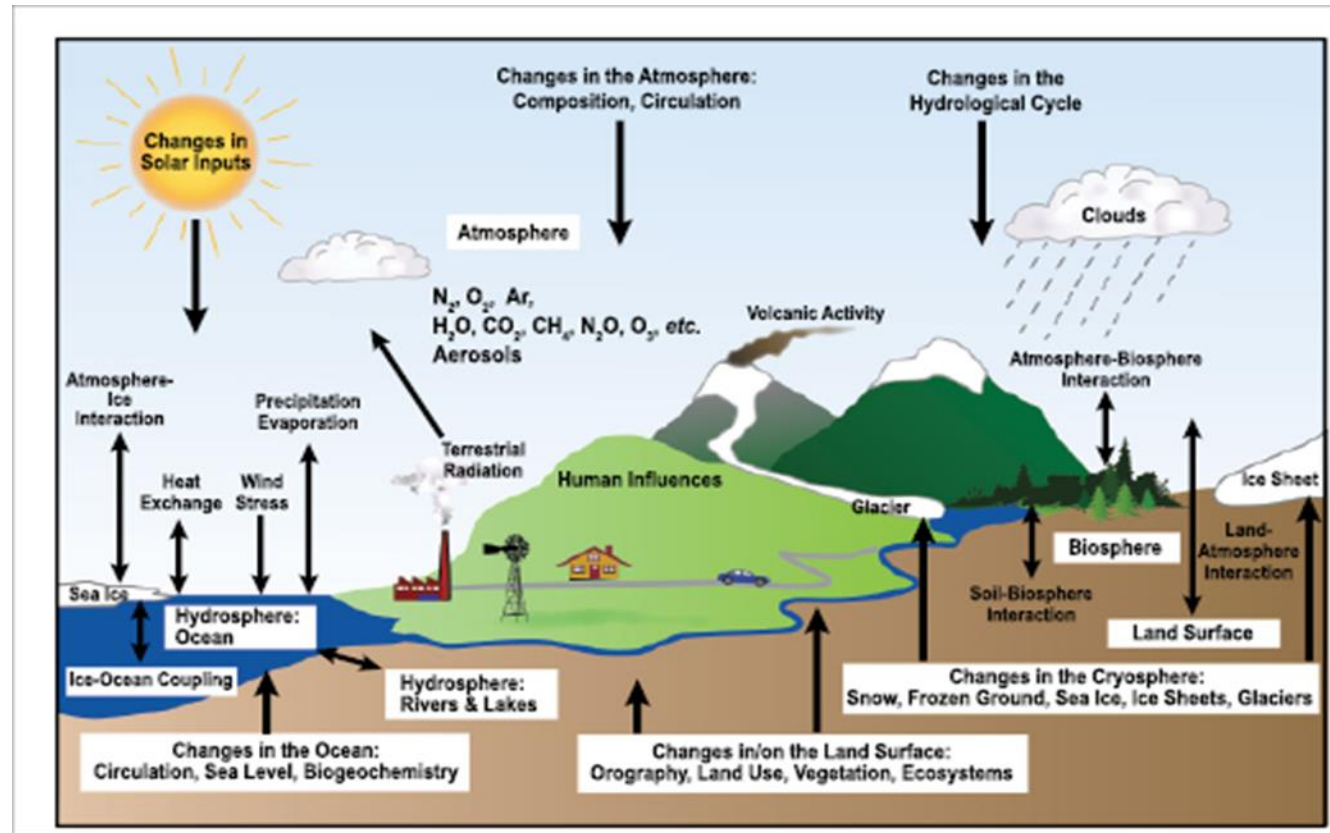


- Interactions
 - Human systems
 - Environment



Understanding climate change

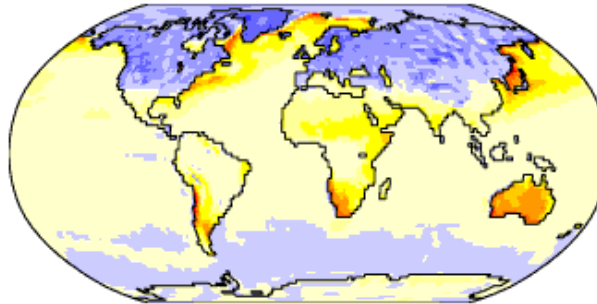
- Human beings are causing the release of carbon dioxide and other greenhouse gases to the atmosphere at rates much faster than the earth can cycle them. Fossil fuels - oil, coal, natural gas, and their derivatives - were formed through the compression of organic (once living) material for millions of years, yet billions of tons of these fuels are now being burned per year.
- It is clear that statistics will improve the understanding of the CC processes



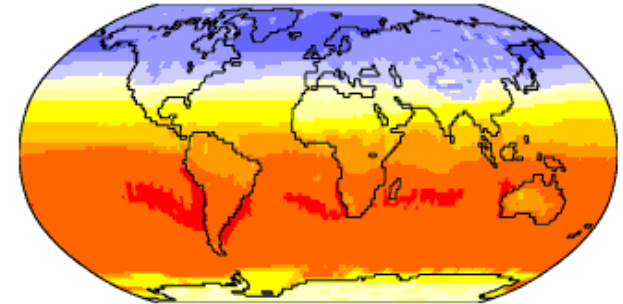
CC mechanism and global warming – Non-Radiative Components

Dec

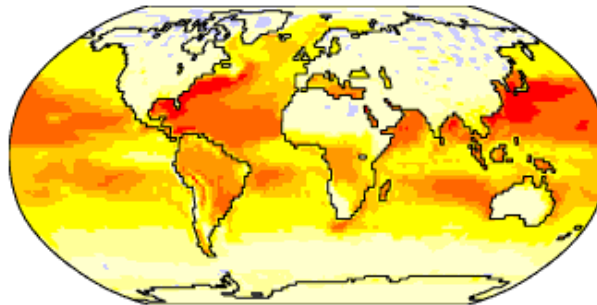
Sensible Heat Flux



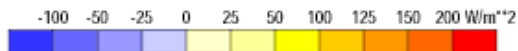
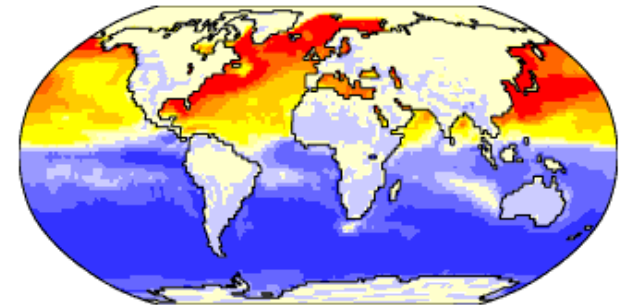
Net Radiation



Latent Heat Flux



Storage Change



Data: NCEP/NCAR Reanalysis Project, 1959-1997 Climatologies
Animation: Department of Geography, University of Oregon, March 2000

- **Positive values** for sensible and latent heat flux represent energy moving towards the atmosphere,
- **Negative values** represent energy moving away from the atmosphere.

- **Positive values** for change in heat storage represent energy moving out of storage,
- **Negative values** represent energy moving into storage.

Climate change agreements



- The aim of the convention (UNFCCC)
 - ▣ (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels,
 - ▣ (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
 - ▣ (c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."



Climate change agreements

- Paris Agreements
- Essentially dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020.
- On 12 December 2015, The United Nations Conference on Climate Change in Paris concluded with the release of the 'Paris Agreement' ('Agreement').
- Signatories will commit to:
 - Holding the increase in the global average temperature to 'well-below' 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
 - Establishing and communicating progressive (i.e. improved) nationally determined contribution (NDC) targets every five years (with provision to adjust its contribution at any time).
 - Enhancing support to developing countries towards the implementation of economy wide-absolute emission reduction targets.
 - Conserving and enhancing sinks and reservoirs of greenhouse gases in order to reach global peaking 'as soon as possible'.



Climate change agreements

- Paris Agreements
- For developed country parties, providing financial resources to assist developing country parties with implementing their obligations under the Agreement.
- Holding the first global ‘stocktake’ of the Agreement in 2023 and every subsequent five years. This will involve a formal review of countries’ progress in meeting their commitments under the Agreement, including updates on the achievement of targets.
- Operating within a ‘Transparency Framework.’ Under this framework, signatories must disclose information regarding their:
 - greenhouse gas emissions;
 - implementation and achievement of nationally determined contributions; and
 - financial assistance to developing countries,
 - via national communications, biennial reports and update reports, international assessment and consultation.



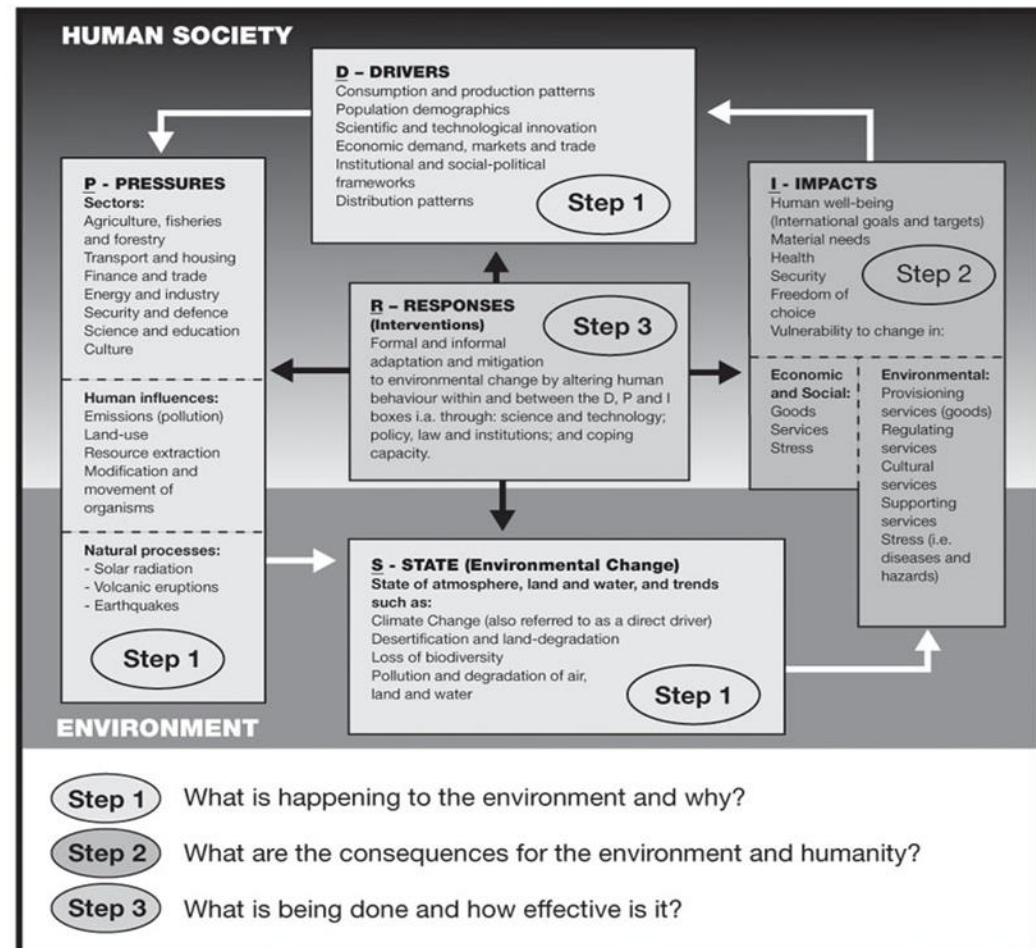
Climate change agreements

- Paris Agreements
- This information will be used for tracking purposes, determination of priorities and as part of the global 'stocktakes'.
- Implementation of the Agreement and promotion of compliance with its provisions will be undertaken by a non-adversarial and non-punitive committee which will report annually to the Agreement signatories.
- The non-binding decision, which prefaces the Agreement, urges parties to adopt the Agreement and to:
 - Communicate by 2020, mid-century, long-term low greenhouse gas emission strategies to the Secretariat; and
 - For developed countries, seek to achieve the goal of jointly providing USD 100 billion annually in climate aid support to developing countries by 2020.

Climate change reporting

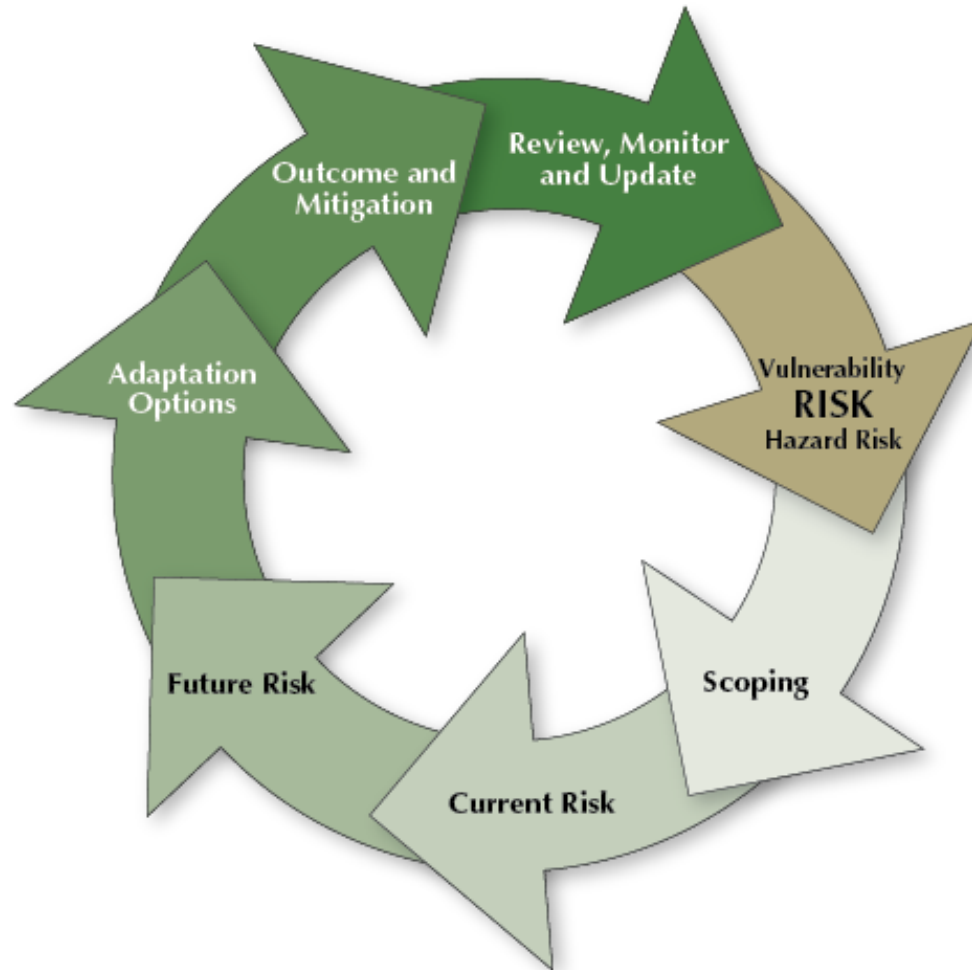
Step 3

- Why Report? Overview of the reporting requirements
- Main: National Communications (NCs) and Biennial Update Reports (BURs)
- Other focused reports: NAPs, NDCs NAPAs, INDCs, BURs, NAMAs ... see following slides
- Which 5 EAC countries (and South Sudan) have started reporting?
- Paris Agreements: see following slides....



Climate change reporting

Main concerns





Climate change reporting

- National Communications (NCs)
 - ▣ Almost all countries have submitted their initial NC (INC) and Second NC (SNC)
 - ▣ Also many countries have submitted their Third NC – TNC
- National communications - Key chapters/topics
 - ▣ National circumstances: climate, geography, economy, land use, social/cultures
 - ▣ GHG Inventories
 - ▣ Mitigation
 - ▣ Adaptation
 - ▣ Education, communication and outreach
 - ▣ Research and systematic observations
 - ▣ Finance

Reporting

- **Biennial Update Report (BUR)**
 - ▣ Similar to NC but updated info is available - More up to date
- **INDCs and NDCs**
 - ▣ Intended Nationally Determined Contributions (INDCs) - countries publicly outlined what post-2020 climate actions they intended to take under the new international agreement.
 - ▣ NDC- countries formally join the Paris Agreement and look forward to implementation of these climate actions – the “intended” is dropped and an INDC is converted into a Nationally Determined Contribution (NDC).
 - ▣ Following the Paris Agreement , countries have to outline and communicate their post-2020 climate actions...

Climate change reporting

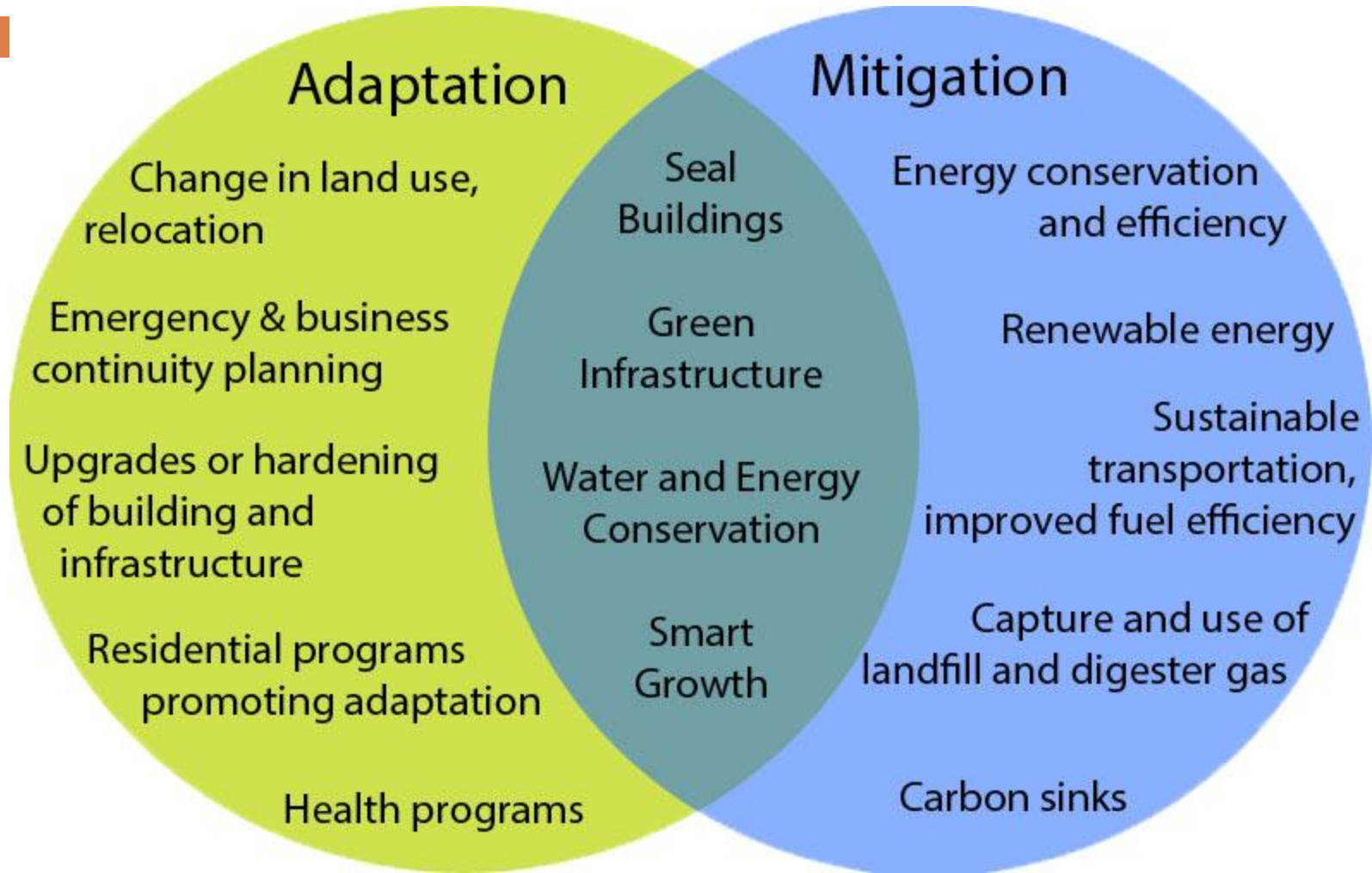


- Focused reporting – main ones
- **Mitigation:** What are the best options for the country?
- Nationally appropriate mitigation assessment (NAMA): refer to any action that reduces emissions in developing countries and is prepared under the umbrella of a national governmental initiative. Negotiations pursuant to the Bali Action Plan concluded in Doha. - developing country Parties will take NAMAs in the context of sustainable development - within an economic sector, or actions across sectors. NAMAs are supported and enabled by technology, financing, and capacity-building and are aimed at achieving a reduction in emissions relative to 'business as usual' emissions in 2020.
- Information on measurement, reporting and verification (MRV) of mitigation actions
- Two contexts: (i) At the National Level as a formal submission by Parties declaring intent to mitigate greenhouse gas emissions in a manner commensurate with their capacity and in line with their national development goals; (ii) At the Individual Action Level as detailed actions or groups of actions designed to help a country meet their mitigation objectives within the context of national development goals.
- Others: e.g Technology Needs Assessments (TNAs) and REDD+ - Reducing emissions from deforestation and forest degradation

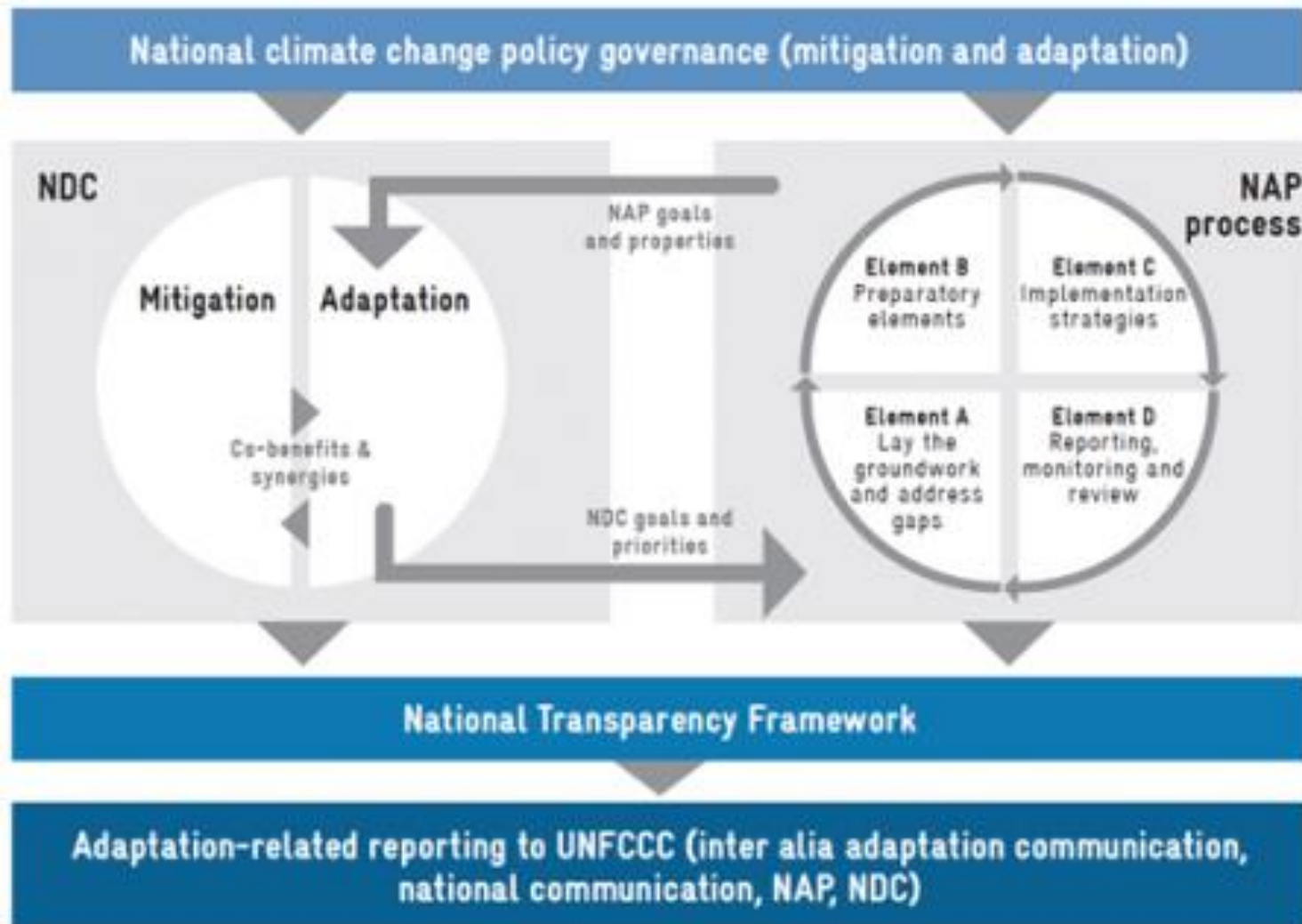
Climate change reporting

- Others ... **Adaptation**
- NAPs, National Adaptation Plans: as a means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs- is also a follow up of NAPAs.
- NAPAs - National Adaptation Programmes of Action: provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent NAPAs: and immediate needs to adapt to climate change – those for which further delay would increase vulnerability and/or costs at a later stage.
- The main content of NAPAs is a list of ranked priority adaptation activities and projects. - see UNFCCC NAPA Project Database.
- The NAPA project database webpage contains
 - ▣ an index of projects by country, including project costs
 - ▣ an index of projects by sector, including project costs
 - ▣ lists of project profiles by sector,
 - ▣ lists of projects by country showing cost with a downloadable pdf of project profiles per country

CC Adaptation and Mitigation



Example processes



Submissions to UNFCCC

- How to submit – See [UNFCCC link....](#)
 - [NAI NC](#) submission procedures
- Useful links
 - Submitted Biennial Update Reports (BURs)
 - MRV developing countries
 - National Reports from non-Annex I Parties
 - Consideration of Reports
 - GHG Data Interface
- Further guidance
 - Guidelines and Manuals for the Preparation of non-Annex I National Reports and International Consultation and Analysis
 - Technical and Financial Support
 - Tools and Training Materials

Reporting to UNFCCC

National Reports from non-Annex Parties

Submitted NCs

Submitted BURs

Reporting for developing countries is implemented through national communications (NCs) and biennial update reports (BURs). Developing country Parties are required to submit their first NC within three years of entering the Convention, and every four years thereafter.

The first BUR should be, consistent with the Party's capabilities or level of support provided, submitted by December 2014, and every two years thereafter. Least developed country Parties and small island developing States may submit BURs at their own discretion.

Source: UNFCCC

Reporting to UNFCCC

Consideration of Reports	
Compilation and Synthesis Reports	International Consultation and Analysis
<p>Verification of reports is addressed at the international level through the process of international consultation and analysis of BURs. This is to increase the transparency of mitigation actions and their effects as well as support needed and received.</p> <p>Information contained in initial NCs submitted by non-Annex I Parties up to April 1, 2005 is compiled and synthesized into one comprehensive document. The most recent is the sixth Compilation and Synthesis report.</p>	

Reporting to UNFCCC

Financial and Technical Support

Financial and technical assistance are essential to helping developing countries prepare their NCs and BURS.

Some of the key actors involved in assisting developing countries with their national reports include the secretariat, the Global Environment Fund ([GEF](#)), Global Support Programme for national communications and biennial update reports ([UNEP/UNDP](#)), the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention ([CGE](#)), and Annex I Parties.

Reporting to UNFCCC

- The Conference of the Parties (COP), at its twenty-first session held in Paris in 2015, established a Capacity-building Initiative for Transparency (CBIT) in order to build institutional and technical capacity, both pre-and post-2020. Upon request of the COP, the GEF made arrangements to support the establishment and operation of the CBIT. Further information is accessible at the [GEF website](#).

Tools and Training Materials

National communications

Biennial update reports

International Consultation and Analysis

The secretariat, the IPCC, the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention ([CGE](#)), and related external sources provide tools, materials, and training, including [UNFCCC-CASTT](#), to facilitate measuring, reporting, and verification in developing countries in accordance with the guidelines to the Convention.

Reporting and institutional arrangements

Figure III-1.

Key stages of sustainable institutional arrangements



How can statistics on environment, climate change and others help in reporting?

- FDES cross cutting issues; energy-agriculture-wastes-land use, water, climate.....
- Demo on GHG software – IPCC 2006
- Demo on Mitigation
- Adaptation example from NAP

Adaptation example



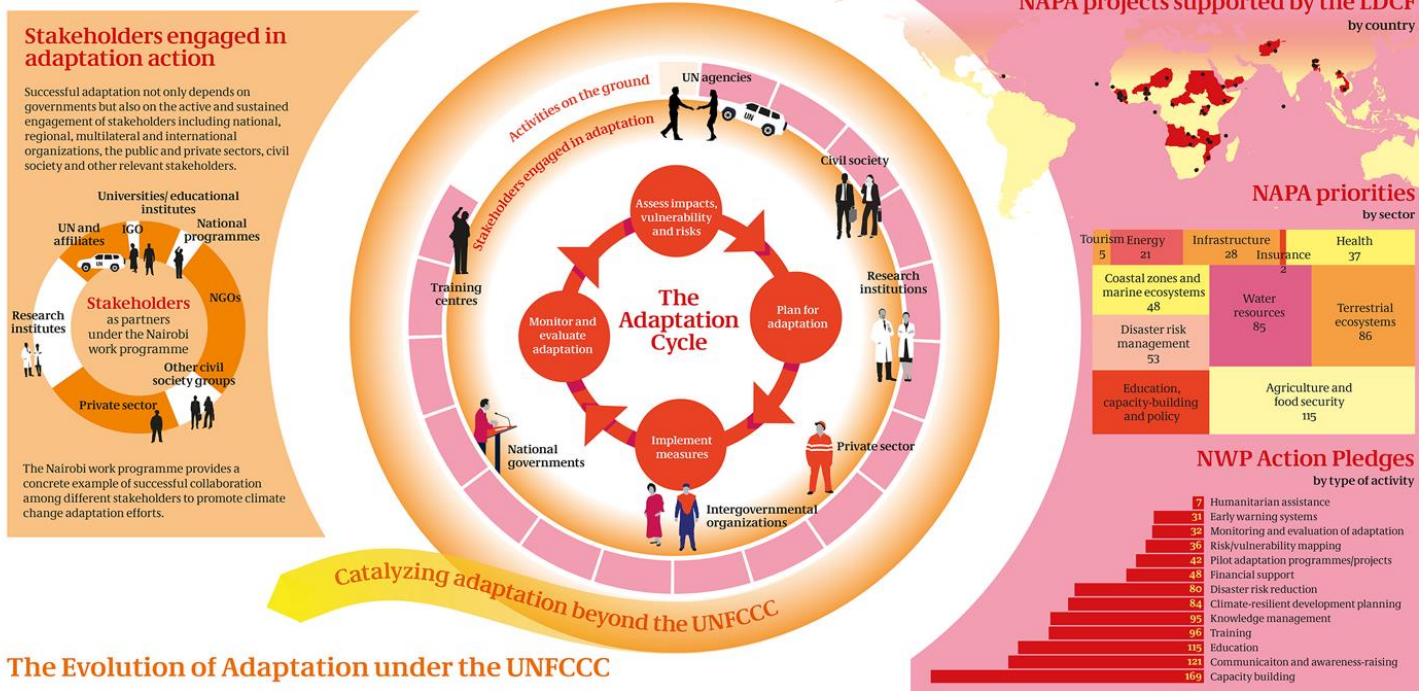
Building Resilience in a Changing Climate

Adaptation under the UNFCCC

Adaptation to the adverse effects of climate change is vital in order to respond to the impacts of climate change that are already happening, while at the same time prepare for future impacts.

Activities on the ground

The UNFCCC has enabled planning and implementation of concrete adaptation activities, including under the National Adaptation Programmes of Action (NAPAs) and the Nairobi work programme. There are 139 NAPA projects in the pipeline and 72 ready for, or under full implementation.



The Evolution of Adaptation under the UNFCCC



GHG calculations

Calculations

Simplest (Tier 1):

$$CO_2e = \sum_{i=1}^n GHG_i \times GWP_i \quad (Eq. A - 1)$$

Emissions (E) = Activity data (AD) x Emission factor (EF)

Complex (Tier 2, 3):

$$Total\ Emissions = \sum_1^i (E_{CO_2} \times GWP_{CO_2})_i + \sum_1^i (E_{CH_4} \times GWP_{CH_4})_i + \sum_1^i (E_{N_2O} \times GWP_{N_2O})_i + \sum_1^i (E_{PFC} \times GWP_{PFC})_i + \sum_1^i (E_{HFC} \times GWP_{HFC})_i + \sum_1^i (E_{SF_6} \times GWP_{SF_6})_i$$

$$E_{i,s,h} = \sum_{c=1}^{244} \left(E_{i,c,s,j} \frac{X_{c,s,j,m}}{\sum_{m=1}^{12} X_{c,s,j,m}} \frac{7}{N_{m,j}} \frac{Y_{c,s,d}}{\sum_{d=1}^7 Y_{c,s,d}} \frac{Z_{c,s,d,h,t}}{\sum_{h=1}^{24} Z_{c,s,d,h,t}} \right)$$

Annual emissions
Monthly share
Daily share
Hourly share

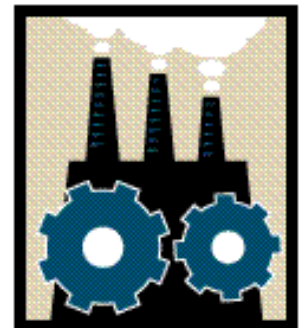
Where:

E = Emissions; x = Country, sector, year and month specific activity; y = Country, sector and day specific activity

z = Country, sector, day hour and time zone specific activity; n = month and year specific numbers of days

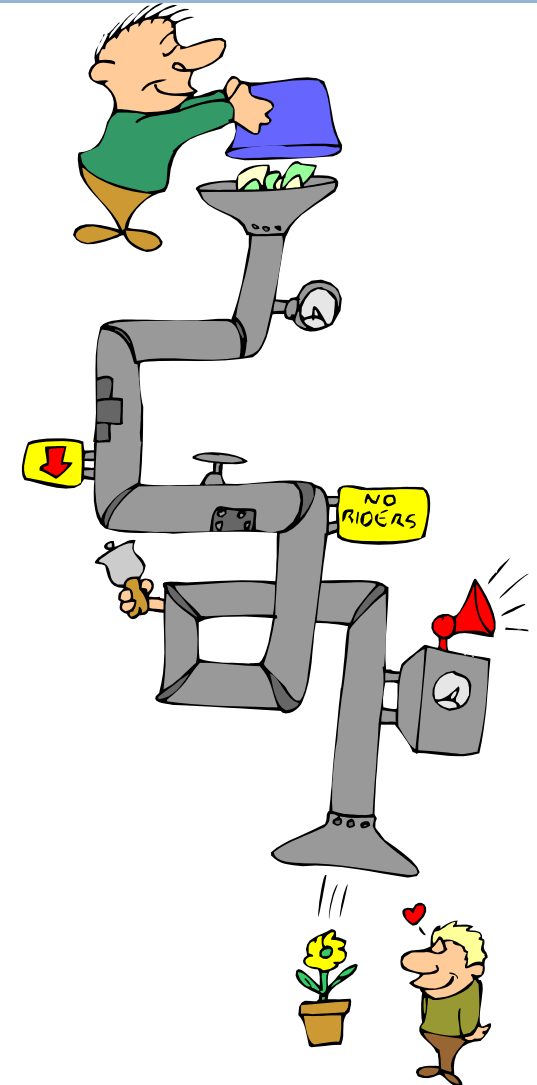
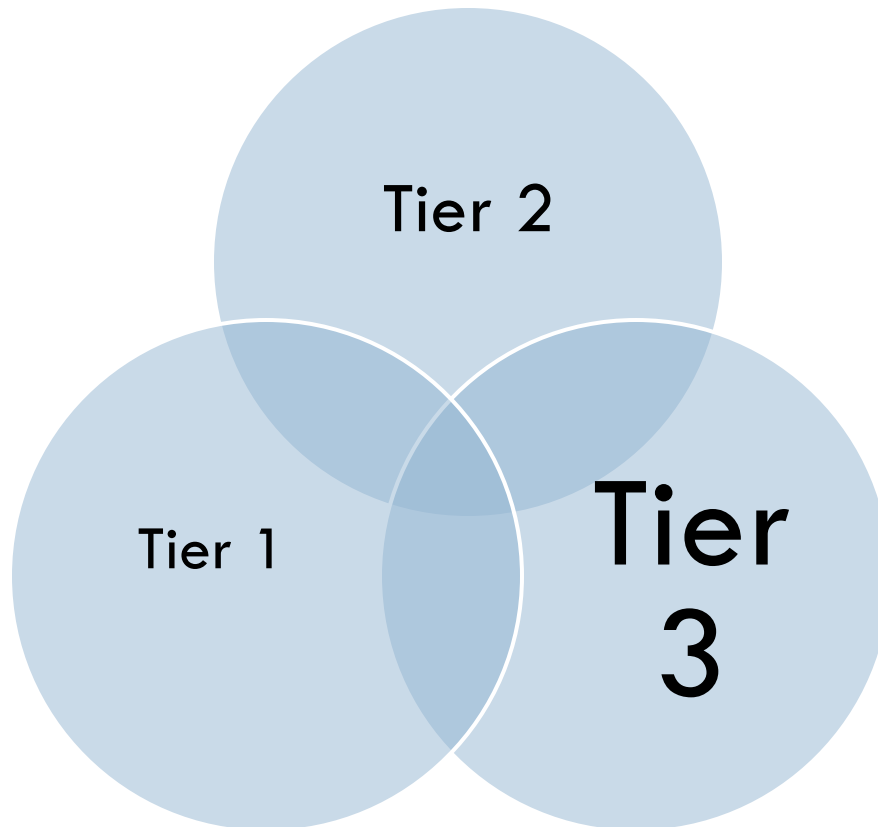
i = Grid code (i.e. A-G); s = Sector; h = hour (also referenced to 1070); c = Country; j = Year; m = Month; d = Weekday

t = Time zone



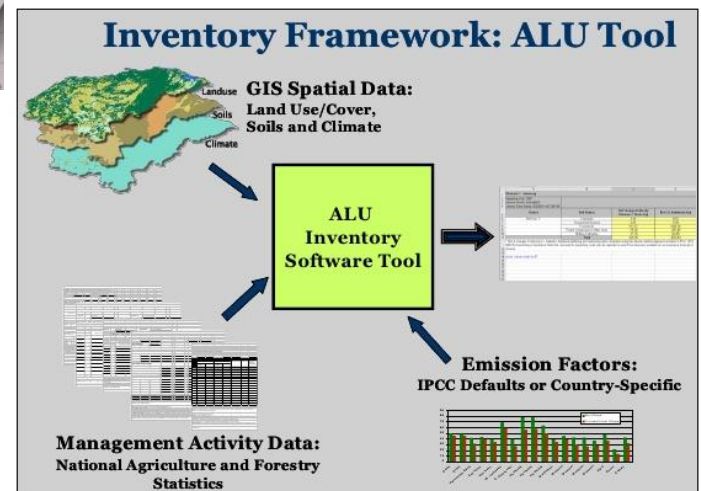
GHG calculations

- Complexity of calculations and data needs increases with increase in Tier levels



GHG inventory manuals and Software

□ IPCC Guidelines



UNFCCC and IPCC TFI (4)

Currently, all the Parties use these under the UNFCCC and the Kyoto Protocol.

Annex I Parties shall use GPG.
Non-Annex I Parties are encouraged to use GPG.

GPG2000 (non-LULUCF) **GPG2003** (LULUCF)

1995 IPCC Guidelines

Revised 1996 IPCC Guidelines



Annex I Parties must use from 2015

2006 IPCC Guidelines



Revision/Update by the IPCC

GHG sectors – Current for Non Annex I countries



Energy

Electricity
Transport
Manufacturing
Commercial
Households Others



Industrial processes



Agriculture

Livestock
Soils
etc



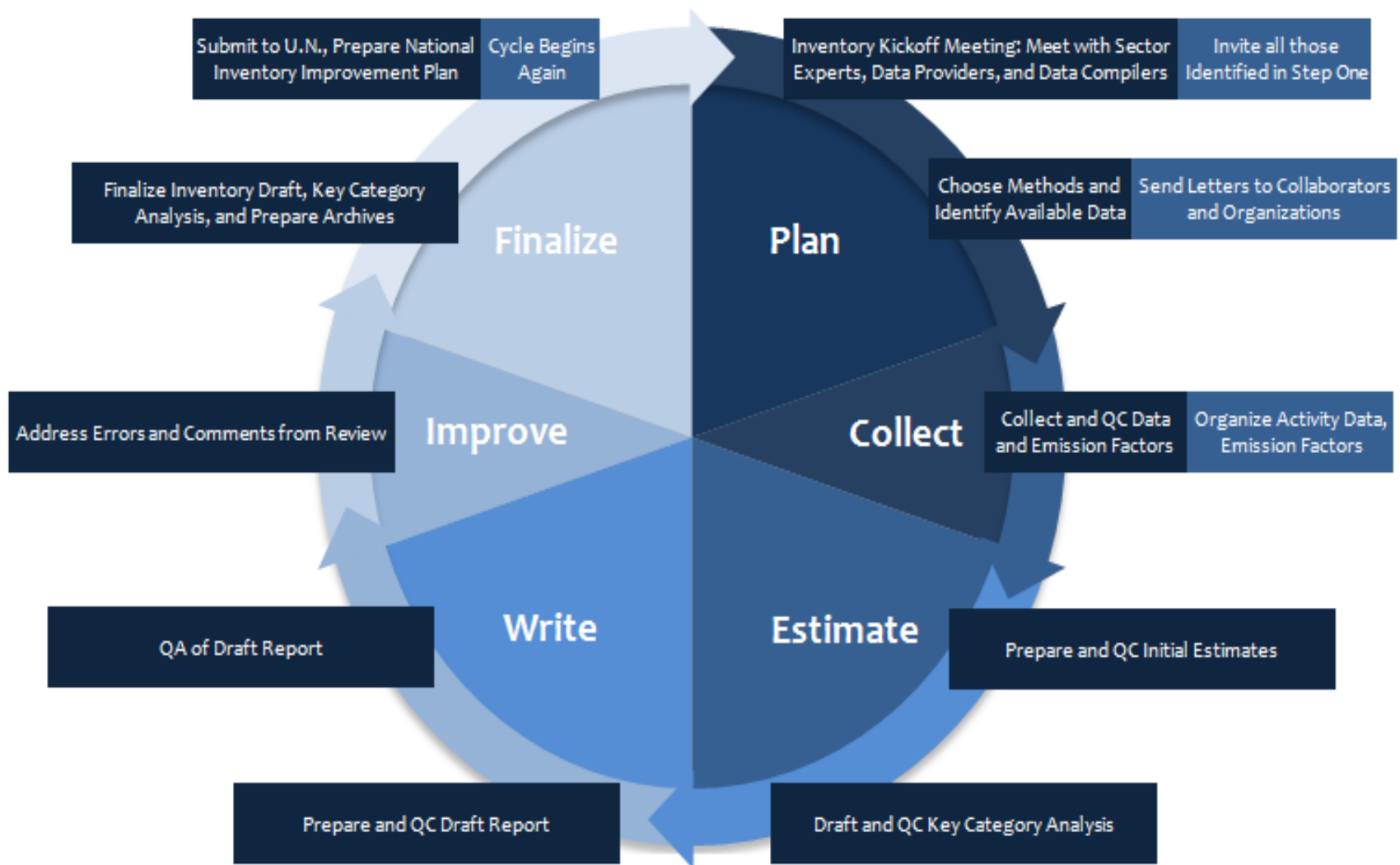
Land Use, Land Use Change and Forestry



Waste Solid Liquid



The GHG inventory cycle



ADAPTATION INDICATORS

National	Sector	County
<ul style="list-style-type: none"> • Human development index 	<ul style="list-style-type: none"> • Number of sectors planning, budgeting and implementing climate change adaptation actions 	<ul style="list-style-type: none"> • Number of counties that have integrated climate change adaptation in their CIDPs
<ul style="list-style-type: none"> • Percentage of climate related national loss and damage in the public and private sectors 	<ul style="list-style-type: none"> • National and county performance contracting systems integrating climate change adaptation targets 	<ul style="list-style-type: none"> • Number of counties budgeting and implementing adaptation programmes;
<ul style="list-style-type: none"> • Population living below the poverty line 	<ul style="list-style-type: none"> • Amount of loss and damage from climate hazards per sector 	<ul style="list-style-type: none"> • No of national and county level programmes/projects incorporating ecosystem-based adaptation and community based adaptation approaches
<ul style="list-style-type: none"> • National vulnerability index 	<ul style="list-style-type: none"> • Amount of private sector financing for adaptation 	<ul style="list-style-type: none"> • Number of households with timely access to climate information

ADAPTATION INDICATORS

National	Sector	County
<ul style="list-style-type: none">• National vulnerability index	<ul style="list-style-type: none">• Amount of private sector financing for adaptation	<ul style="list-style-type: none">• Number of households with timely access to climate information
		<ul style="list-style-type: none">• Number of infrastructure development cases/application using climate smart designs (energy, ICT, transport) •Number of people reached through climate change adaptation public awareness campaigns •Number of public servants trained on climate change adaptation •Number of functional climate change coordination structures •Percentage of population requiring humanitarian assistance

For further progress...

- The assistance of all partners are required

Thank You for your Kind Attention. Dr Anand Sookun: asookun@gmail.com

