



Information Communication Technologies (ICTs) and Climate Change

**ITU/WMO Seminar “Use of radio spectrum for meteorology: weather, water and climate monitoring and prediction”
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ITU Overview - specialized UN Agency responsible for telecommunications/ICTs. Established in 1865.

191 Member States, 700+ Sector Members and Associates

Plenipotentiary Conference



ITU

*Committed to Connecting
the World*



ITU-R

**Radiocommunication standardization and global
radio spectrum management**

**Radiocommunication Assembly &
World Radiocommunication Conference**

World

**Telecommunication
Standardization
Assembly**



ITU-T

**Telecommunication
standardization of
networks and service
aspects**

World

**Telecommunication
Development
Conference**



ITU-D

**Assisting implementation
and operation of
telecommunications in
developing countries**



ITU Structure and Management Team

**ITU has federal structure:
General Secretariat +
three Sectors:
ITU-D, ITU-R and ITU-T**



**Hamadoun Touré
Mali**

**Plenipotentiary
Conference**

Council

**General Secretary,
Deputy General-Secretary**

Coordination Committee

**World Telecommunication
Policy Forum**

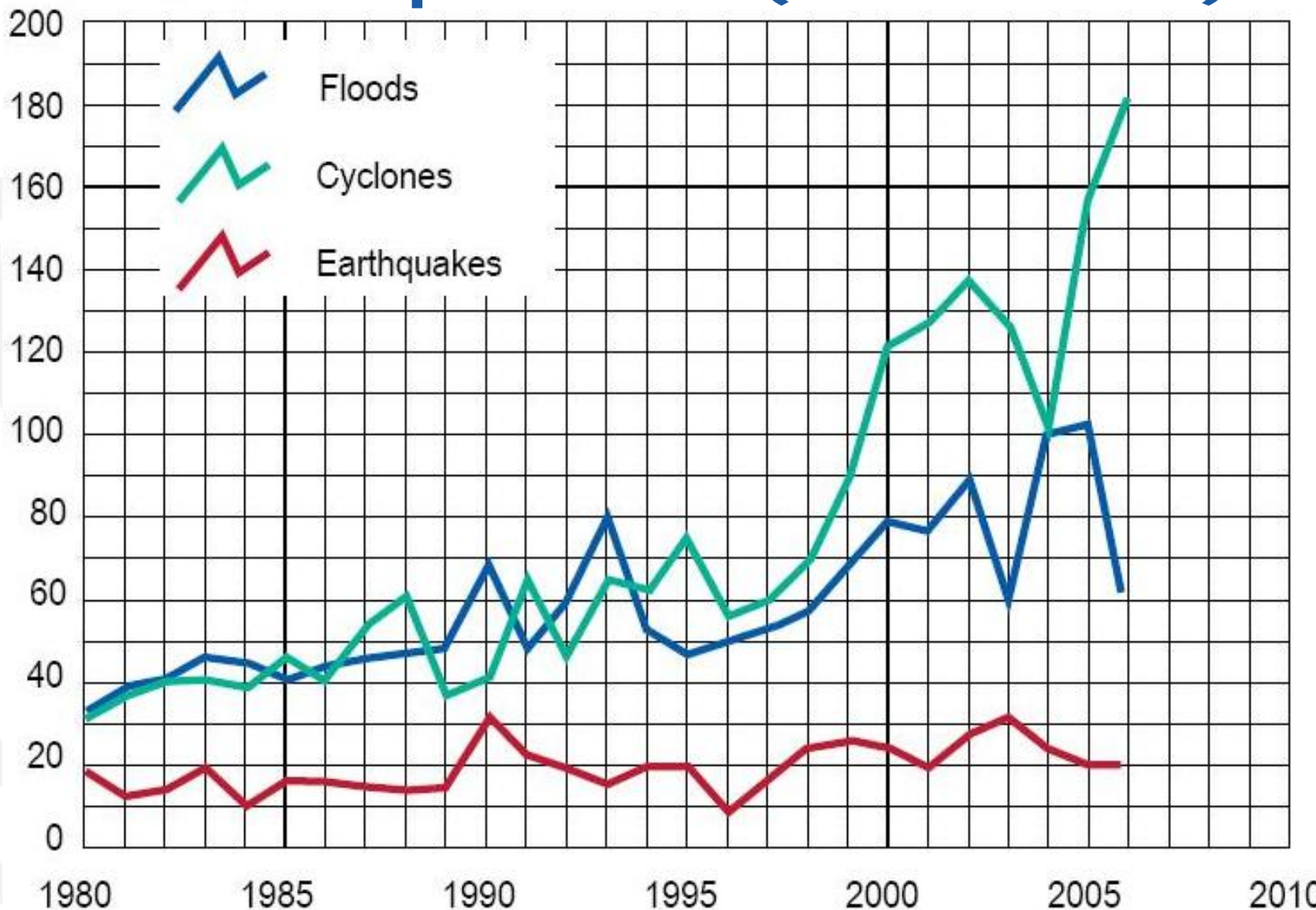


Agenda

- The evidence for climate change
- ICTs ...
 - as a cause of global warming
 - in monitoring climate change
 - for mitigating climate change
 - for adaptation
- ITU and Climate Change



Number of Natural Disasters per Year (1980-2007)

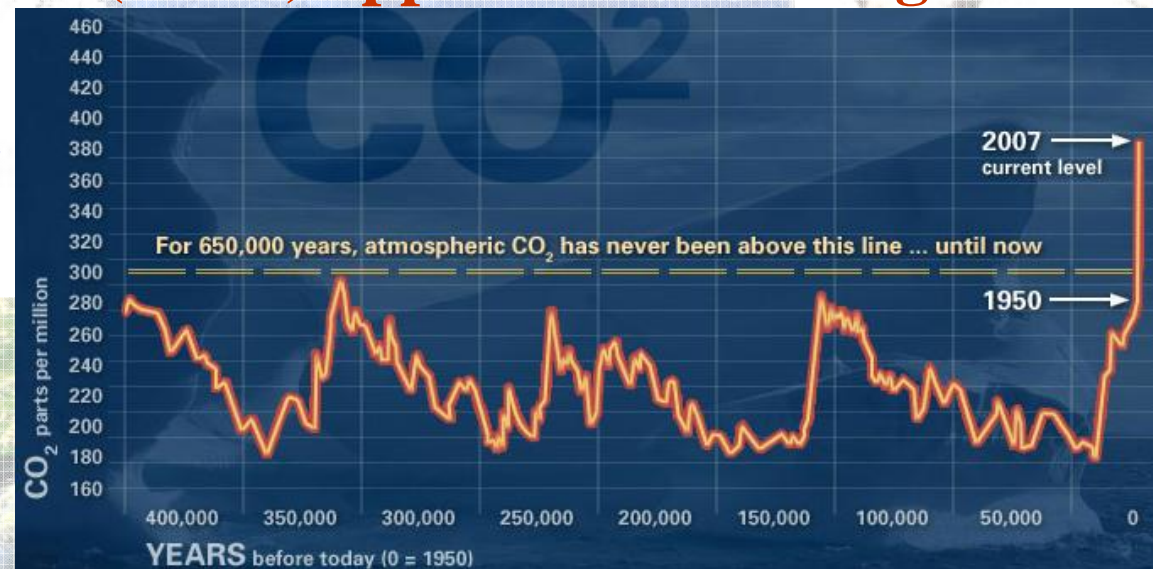


Disaster Risk Reduction Global Review 2007

United Nations, 2007, Geneva, Switzerland

Although there are various opinions on Climate Change and what to do about it, the scientific body of evidence that **human activity is having an impact on the earth's climate is almost irrefutable.**

Greenhouse gas emissions (GHG) appear to be driving climate change, hence the need to reduce CO₂ and other greenhouse gas emissions.



No one knows for sure what the ultimate effects will be of a drastically changing climate, but it is likely to include world-wide flooding, loss of species and habitat and unpredictable weather. In any case, **Climate Change poses a serious problem to the entire planet.**



ICTs in Monitoring Climate Change

ICTs related parts

World Weather Watch System by WMO

Global Observing System

Global Telecommunication System

Global Data Processing System

spectrum
radio techn.
radiocommunications
telecommunications
information technologies

Disaster prevention organizations



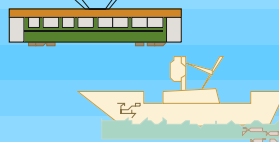
Agriculture

Information media & general public

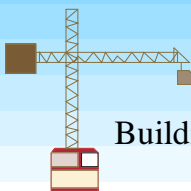


Environment & health

Transport



Building



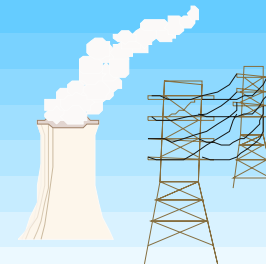
Recreation & tourism



Water resources

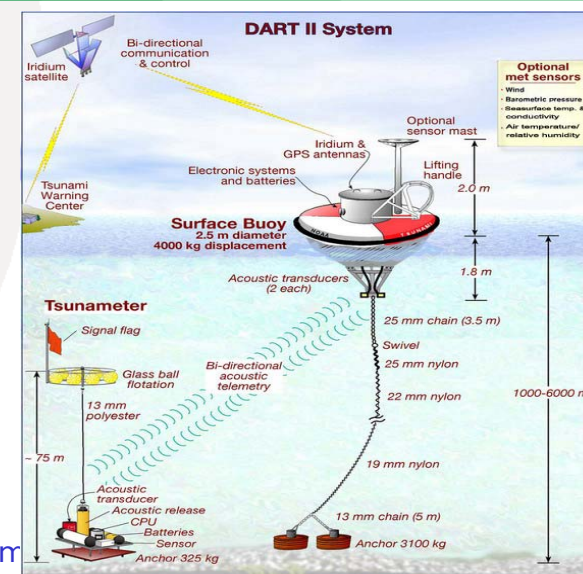
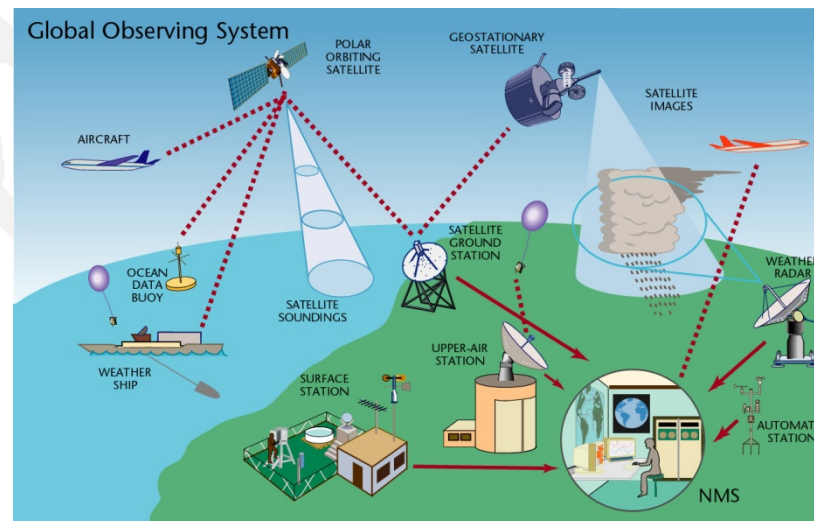


Electrical utilities & energy



ICTs at work for monitoring climate change

- WMO World Weather Watch, incorporating:
 - Global Observing system
 - Global Telecom System
 - Global Data Processing system
- Remote sensing
- Environmental monitoring
 - Tsunami early-warning system
- Digital climate forecasting models
- GPS-enabled telemetry
- Ubiquitous sensor networks





Role of Telecommunications in Adaptation and Mitigation

- Adaptation to the adverse effects of climate change is a key issue for all countries, but especially for developing countries, which are often the most vulnerable and the least equipped to protect their population.
- ICTs are the major source of information for prediction of climate change, preparation and monitoring of National Adaptation/ Mitigation Plans/Programmes.
- ICTs form the basis of emergency telecommunication systems that are saving lives and properties.



ICT and Mitigation

Two main areas:

- Mitigation of negative effect of human activities on climate – the main activity - reduction of green house gas emissions produced by ICT equipment and reducing energy consumption in other industries due to the use of ICTs.
- Mitigation of negative effect of disasters initiated by climate change – disaster prediction, detection, damage assessment, early warning and emergency telecommunications.

ICT and Mitigation

- ICTs can be a major cross-sectoral tool to reduce greenhouse gas (GHG) emissions. A recent study estimated that ICTs could help reduce total global emissions by 15 percent in 2020, representing carbon savings five times higher than the estimated emissions for the whole ICT sector in 2020 [\[1\]](#).

[\[1\]](#) The Climate Group's SMART 2020 report, researched by McKinsey and Company.



Mitigating the Impact

- **Directly**, e.g., through energy-saving
 - Next-Generation Networks (NGN) should reduce GHG emissions by 40%.
 - Digital radio broadcasting technologies reduce energy consumption by transmitters ~ 10 times.
- **Indirectly**, e.g. ICTs for carbon abatement
 - Video-conferencing to reduce business travel (in Europe by 1% would save 1m CO₂ tonnes).
- **Systemically**, e.g., by “dematerialisation”
 - Electronic publications on INTERNET: electronic books, films, TV programmes (IPTV), musical records, e-commerce – less CDs, DVDs, paper;
 - Intelligent Transport Systems could reduce vehicle carbon emissions below 130g per km.



Towards a climate neutral ICT sector

- BT has reduced carbon emissions by 60% compared since 1996.
- Telefonica created a Climate Change Office in 2008 and is committed to reducing its consumption of network electricity by 30 per cent by 2015.
- NTT's "Total Power Revolution" saved 124m kWh in 2007.
- Other initiatives:
 - GeSI, Green Grid, WattWatt, FTTH Council Europe, EU codes of conduct, CBI Task Force etc.



Using ICTs for carbon abatement / displacement

- Reducing / substituting for travel
 - In 2007, Telstra held 7'500 video conferences saving 4'200 tonnes of CO₂
- Flexible work arrangements
 - Each one million EU workers could save one million tonnes of CO₂ annually by telecommuting
- Intelligent Transport Systems (ITS)
 - In-car systems to assist in “eco-driving” can reduce CO₂ emissions by up to 20 per cent
- Dematerialization (replacing atoms with bits)
 - ITU publications on-line save hundreds of tonnes of paper and significantly reduces CO₂ emissions annually compared with printing and distribution of paper copies

Sources: *Climate Risk report for Telstra, ETNO/WWF report, Toyota, ITU*



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Reduction of GHG Emissions by Mobile Radiocommunication System

- Sustainable energy use based on:
 - use of radio standby mode – power consumption can be reduced up to 40% under low traffic and by 10-20% on overall;
 - optimization of remote radio units by moving RF converters and power amplifiers from the base to top of the tower – reduction up to 30%;
 - use of advanced air conditioners and/or passive cooling systems – 10-15%, etc.
- Use of green energy – solar panels, wind turbines, etc.

These measures in combination with optimal network design and “smart” antennas will allow to reduce cellular network CO₂ footprint by ~ 50%.



**ITU and
Climate
Change**

ITU Role, Strategies and Programmes related to Climate Change



ITU's Role in Climate Change

ITU creates:

- **Legal basis for Telecommunication Development**
 - developing regulatory basis (treaty status Regulations) for introduction and use of “green” telecommunication systems;
 - providing access to radio spectrum and satellite orbit;
 - providing necessary conditions for operation of telecommunication systems;
- **Technical basis**
 - developing ITU technical standards for telecommunication networks, systems and equipment with reduced power consumption and climate monitoring/prediction systems ;
 - developing guidelines for the use of such systems/equipment;
- **Organizational basis and operations**
 - developing awareness about the use of telecommunications/ICTs in combating climate change;
 - assisting Member States as regards telecommunications needs;
 - developing guidelines for use of ICTs for mitigation/adaption to climate change including the use of emergency telecommunications.



ITU's Engagement with Climate Change

Main directions:

- Monitoring Climate Change
- ICT as a clean technology
- Adaptation and Mitigation
- Climate Neutral ITU



Monitoring Climate Change

ITU:

- *As the steward of the global framework for spectrum:*
 - provides for the radio-frequency spectrum and orbit resources for radio systems and applications used for climate monitoring, weather forecasting, disaster prediction, detection, mitigation of negative effect of disasters and data exchange and dissimulation systems;
 - develops mandatory and voluntary radiocommunication standards (Radio Regulations and ITU-R Recommendations) to foster the operation without interference of these radio systems;
- Develops voluntary telecommunication standards and protocols (ITU-T Recommendations) for wired telecommunication systems employed for environmental data exchange;
- Provide guidance to Administrations on the use such systems/applications.



ICTs as a Clean Technology

ITU:

- *As the preeminent global body for standardization in the field of ICTs:*
 - works to limit and ultimately reduce greenhouse gas (GHG) emissions through the development of standards;
 - develops regulations/Plans stipulating the use of new “green” technologies and telecommunication standards;
 - promotes the use of more energy efficient devices and networks.



Adaptation and Mitigation

ITU:

- *As a core function of its development mission:*
- assisting Member States in the use of ICTs for e-environment and sustainable development;
- assisting in adapting to and mitigating the negative effects of climate change, including the use of emergency telecommunications and alerting systems for disaster relief;
- creating a special database of frequencies which could be used in a country for emergency radiocommunications (in accordance with Res. 647 (WRC-07)).



ICTs for adaptation: ITU Role

- Telecommunications/ICTs for disaster preparedness
 - Tampere Convention
 - PP-06 Resolutions 36 and 136 on use ICTs for humanitarian assistance
 - WRC Resolutions 646, 647, 673 on use of radiocommunications for environmental monitoring, public protection and disaster relief
 - WTDC-06 Resolution 34 on the role of ICTs in mitigation of effects of disasters and humanitarian assistance
 - ITU-R and ITU-T Recommendations on the use of telecommunications (wired and wireless) for disaster detection, early warning, disaster relief and the relevant protocols (e.g. Common Alerting Protocol (CAP))
 - Partnership Coordination Panel on Telecoms for Disaster Relief (PCP-TDR)

ITU and Disaster Effect Mitigation

In 5 words, *Committed to connecting the world*: → even more so in distress situations!

- **Long-time work on telecom for emergency situations**
 - *Morse code ... (it was a long time ago...)*
 - *radio used for the first time for saving the lives of sailors aboard the battleship General-Admiral Apraksin at the end of 19th century*
 - *GMDSS (Global Maritime Distress and Safety System)*
- **Three recent examples**
 - *Tampere Convention → to facilitate exchange of telecom equipment in disaster relief operations*
 - *WRC-07: allocated additional spectrum for systems involved in disaster prediction/detection and emergency communications*
 - *Standardization work on call priority & alert message delivery*



Assisting Developing Countries

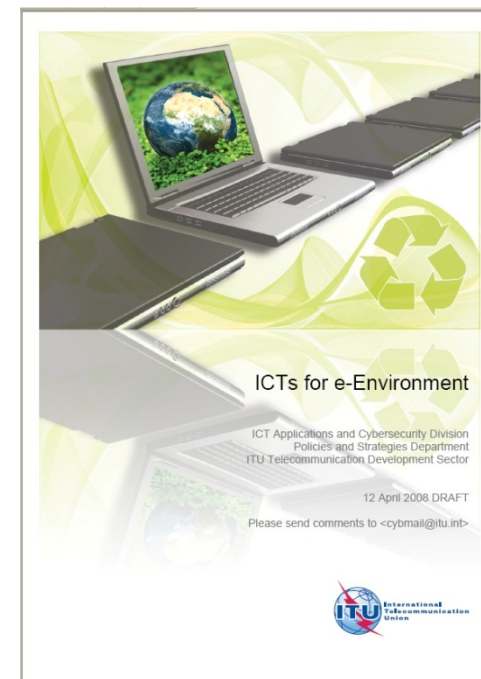
- Develop guidelines, training materials and toolkits on technology & policy aspects of e-Environment applications
- Assist developing countries in implementing relevant ICT applications for environment and sustainable development
- Challenges and opportunities
 - Awareness promotion
 - Work with international partners for capacity building and coordinated initiatives
 - Support developing countries for pilot project implementation
 - Monitor and evaluate results; share best practices with other countries



... with highest priority to climate change

ICTs for e-Environment Report

- Objective: Provide guidelines for developing countries on the use of ICTs for better management and protection of the environment as a key part of their development process, with particular focus on **climate change**
- Examines six areas of ICT use: Environmental Observation, Analysis, Planning, Management & Protection, ICT Mitigation and Capacity Building
- **Recommendations for developing countries:**
 - Strengthen national analysis, planning and implementation
 - Use existing and new financial mechanisms
 - Foster technology transfer
 - Promote best practices
 - Promote Public-Private partnerships





Towards a climate-neutral ITU

- Developing a knowledge base and repository
- Promoting a global understanding through international fora and agreements
- Achieving a climate-neutral ITU within three years
 - Conducting annual carbon audits consistent with accepted International Standards
 - Increasing amount of electronic publications
 - Reducing ITU's own GHG emissions, e.g. through using remote collaboration tools
 - Compensating for residual emissions: e.g. supporting projects under Clean Development Mechanism



Climate Neutral ITU

ITU has been incorporating 'green' practices such as:

- recycling of paper and plastic;
- movement towards paperless meetings and event;
- use of double sided printing;
- where paper use is unavoidable, paperless salary 'slips', recycling of printer cartridges;
- use of low energy lighting;
- trialling virtualization of ICT servers;
- providing availability of all publications (where feasible) in paperless format;
- etc.



ITU Study Groups and Climate Change

Few words:

- Developing telecommunication standards (wired and wireless) ITU-R and ITU-T Study Groups take measures to improve environmental characteristics of equipment and networks (e.g. reduce consumption);
- ITU-D Study Groups produce guidelines on the use of “green” telecommunications” and the use of ICTs for combating climate change.
- ITU-T Focus Group on ICTs and Climate Change (FG ICT&CC) developed methodologies for the analysis, evaluation and quantification of greenhouse gas emissions from the ICT sector;
- Implementing WTSA Res. 73 standardization sector modified the scope of ITU-T Study Group 5 and accordingly changed its name to “Environment and Climate”



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Cooperation with UN Agencies and International/National Organizations

- ITU has established strategic partnerships with other UN agencies (e.g. WMO, IMO, ICAO) and specialized UN Groups (e.g. WGET);
- ITU participates in meetings of the UN Framework Convention on Climate Change (UNFCCC) and contributes to the Intergovernmental Panel on Climate Change (IPCC);
- ITU cooperates with international and national agencies and organizations (e.g. EUMETSAT, ESA, JAXA, NASA, NOAA, RSA, meteorological agencies, Group on Earth Observations (GEO), Space Frequency Coordination Group (SFCG), etc.) involved in climate monitoring and emergency telecommunications;
- ITU representatives participate in ITU, WMO and UN events and provide information on the role of ICTs/ telecommunications in combating of negative effects of climate change.



Some Background Materials

- ITU Climate Change site
 - www.itu.int/climate
- Climate Change symposia website
 - <http://www.itu.int/ITU-T/worksem/climatechange>
- ITU and Climate Change Report
 - www.itu.int/ITU-T/techwatch/reports.html
- ITU Background Paper on ICTs and Climate Change
 - http://www.itu.int/dms_pub/itu-t/oth/06/0F/T060F00600C0004PDFE.pdf
- ITU/WMO Handbook "Use of radio spectrum for meteorology: weather, water and climate monitoring and prediction"
 - <http://www.itu.int/publ/R-HDB-45/en>
- Report: Utilization of ICT for disaster management, resources, and active and passive space-based sensing systems as they apply to disaster and emergency relief situations - <http://www.itu.int/publ/D-STG-SG02.22-2010/en>



ITU Symposia on ICTs and Climate Change

- Three ITU symposia “ICT and Climate Change” were organized by ITU-T (in cooperation with other ITU Sectors):
 - 15-16 April 2008, in Kyoto, Japan
 - 17-18 June 2008, in London, United Kingdom
 - 8-10 July 2009, in Quito, Ecuador.
 - There were discussions concerning the use of telecommunications/ICTs for mitigating of negative effects of disasters initiated by climate change.
- The first virtual symposia supported by the Telecommunications Technology Association (TTA) of Korea will be held on 23 September.
- See details at: <http://www.itu.int/ITU-T/worksem/climatechange/index.html>



Web resources

- Main ITU Web page on ITU and Climate Change:
→ <http://www.itu.int/themes/climate>
- Climate Change symposia website:
➤ <http://www.itu.int/ITU-T/worksem/climatechange>
- Main ITU Web page on ITU Activities in Disaster Prevention, Mitigation and Relief:
→ <http://www.itu.int/emergencytelecoms>
- ITU Publications – main Web page:
→ <http://www.itu.int/publications/default.aspx>

ITU Sectors publication Web pages are accessible from this main page

**Thank you for your
attention!
questions?**

**Sources: ITU, UN, WMO,
ESA, CNES, JAXA, NASA, NOAA**

Quotes

- *“... ITU is one of the most important stakeholders in terms of climate change”*

Ban Ki-moon

UN Secretary-General

- *"ITU is committed to achieving climate neutrality and to working with our membership to promote the use of ICTs as an effective tool to combat climate change"*

Hamadoun I. Touré

ITU Secretary-General

- *"ICT will be instrumental in helping to develop new, climate-friendly technologies that can help economies grow sustainably and reduce emissions in the years ahead"*

Srgjan Kerim

President, UN General Assembly



WRC-07 Resolutions

- New Resolution 647 (WRC-07) "Spectrum management guidelines for emergency and disaster relief radiocommunication".
- New Resolution 673 (WRC-07) "Radiocommunications use for Earth observation applications"
- Several new Resolutions on studies related to the services involved in disaster prediction, detection, relief and other emergency situations.



Radiocommunication Assembly 2007 (RA-07)

RA-07 approved:

- Res. ITU-R 53 “The use of radiocommunications in disaster response and relief”
- Res. ITU-R 55 “ITU-R studies of disaster prediction, detection, mitigation and relief”.

These Resolutions identifies areas that ITU-R Study Groups should address in their studies/activities. They instruct SGs to develop guidelines related to the use of radiocommunication systems in disaster prediction, detection, mitigation and relief.



World Telecommunication Standardization Assembly 2008

- Resolution 73 on Climate Change
 - Notes conclusion of GSS that ICT industry can set an example by committing to specific programs with **objectives to reduce overall GHG emissions**
 - Recognizes that **ICTs can make a substantial contribution and be a major factor to mitigate the effects of climate change**, for example through energy-efficient devices, applications and networks
 - Resolves that **CC is a high priority in ITU** as part of our contribution to UN processes and global efforts to moderate climate change
 - Resolves to promote adoption of recommendations to **ensure greater energy efficient of ICT devices** and reduce GHG emissions in all sectors





WTPF – Opinion 3

- **World Telecommunication and Policy Forum** was held on 22-24 April 2009 in Lisbon, Portugal

- Lisbon Consensus - **Opinion 3 “ICT and the Environment”**

- Invited:

- **the ITU Secretary-General**

- a) to bring the content of Resolution 73 (WTSA-08) on Information and communication technologies and climate change to the attention of the ITU Council and take appropriate actions, taking into consideration the United Nations commitment to lead by example, to achieve climate-neutral status within three years;
- b) to continue, within the mandate of the ITU, to cooperate and collaborate with other entities within the UN in formulating future international efforts for the effective addressing of climate change, and to report the results of these efforts to the Council;

- **The Deputy Secretary-General and the Directors of the Telecommunication Standardization Bureau, the Radiocommunication Bureau and the Telecommunication Development Bureau**

- a) to continue to work together, and with relevant study groups, to raise the awareness of these issues, especially in developing countries, as work progresses in their respective Sectors;
- b) to promote liaison with other relevant organizations in order to avoid duplication of work and to optimize the use of resources.



Developing the Technical Basis for Emergency Telecommunications (Recommendations, Reports, Handbooks, Guidelines)

The ITU global standards (ITU term Recommendations) play a vital role in ensuring an effective emergency response in times of crisis.



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Some ITU Recommendations on ET (1)

- **Rec. ITU-T X.1303 “Common alerting protocol (CAP 1.1)”** – a global standard for simple structured exchange of alerting messages (also accepted by WMO);
- **Rec. ITU-T H.248.44 “Gateway control protocol: Multi-level precedence and pre-emption package”**;
- **Rec. ITU-T H.460.4 “Call priority designation and country/international network of call origination identification for H.323 priority calls”**;
- **Extension of support for Rec. ITU-T E.106 IEPS in various signalling protocols (BICC, SS7, etc)**;
- **Rec. ITU-R BO./BT.1774-1 “Use of satellite and terrestrial broadcast infrastructures for public warning, disaster mitigation and relief”**;



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Some ITU Recommendations on ET (2)

- **Rec. ITU-R M.1042-3 “Disaster communications in the amateur and amateur-satellite services”;**
- **Rec. ITU-R M.1042-3 “Disaster communications in the amateur and amateur-satellite services”;**
- **Rec. ITU-R M.1826 “Harmonized frequency channel plan for broadband public protection and disaster relief operations at 4 940-4 990 MHz in Regions 2 and 3”;**
- **Rec. ITU-R RS.1803, RS.1804 related to development and use of Earth exploration-satellite systems employed for environment including disaster monitoring.**



Some ITU Reports/Handbooks

- Handbook on Emergency Telecommunications (ITU-D) + special supplements “Emergency and Disaster relief” (ITU-R)
- Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services (ITU-R).
- Report ITU-R M.2033 “Radiocommunication objectives and requirements for Public Protection and Disaster Relief (PPDR)”
- ITU Handbook on Best Practice on Emergency Telecommunications (based on studies in 12 countries) (ITU-D).
- Compendium of ITU’s Work in Emergency Telecommunications (covers work of all ITU Sectors ITU-D, ITU-R, ITU-T).

