WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Data systems for adaptation planning and implementation

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World Meteorological Organization
Organisation météorologique mondiale

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Climate Prediction and Adaptation Branch
Climate and Water Department

Outline

- Background
- Data requirements for adaptation
- Data providers and resources
- Challenges
- Solutions
- Recommendations

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Background

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CMA.1

- Methodologies for assessing adaptation needs with a view to assisting developing countries without placing undue burden on them (paragraphs 17-20)
- 19. Also invites the World Meteorological Organization, through its Global Framework for Climate Services […] to regularly inform SBSTA about its activities aimed at improving the availability and accessibility of comprehensive climate information, including observational data, and about how it facilitates the provision and dissemination of the most up-to-date climate model predictions and projections

Overview of the GFCS

- Established during the third World Climate Conference in 2009
  - Endorsed by 13 heads state or government, 81 ministers and 2,500 scientists
- Seeks to guide the development and application of science-based climate information and services in support of decision-making in climate sensitive sectors

GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

Overview of the GFCS

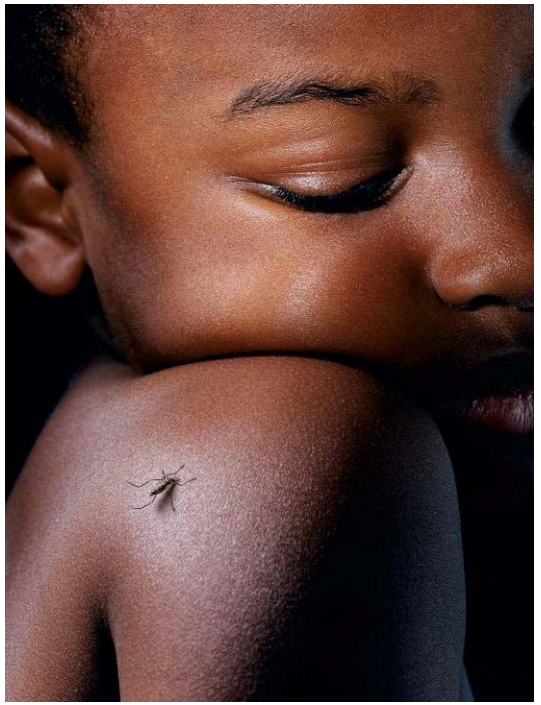
- Member-state governance
- Partners Advisory Committee of international organizations
  - FAO, WHO, WFP, UNISDR, UNDP, UNEP, IFRC, World Bank, European Commission
- 10-year initial implementation plan designed over four years by dozens of experts, backed by initial financing
- Mid-term review and re-design of governance, management and financing just completed

GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

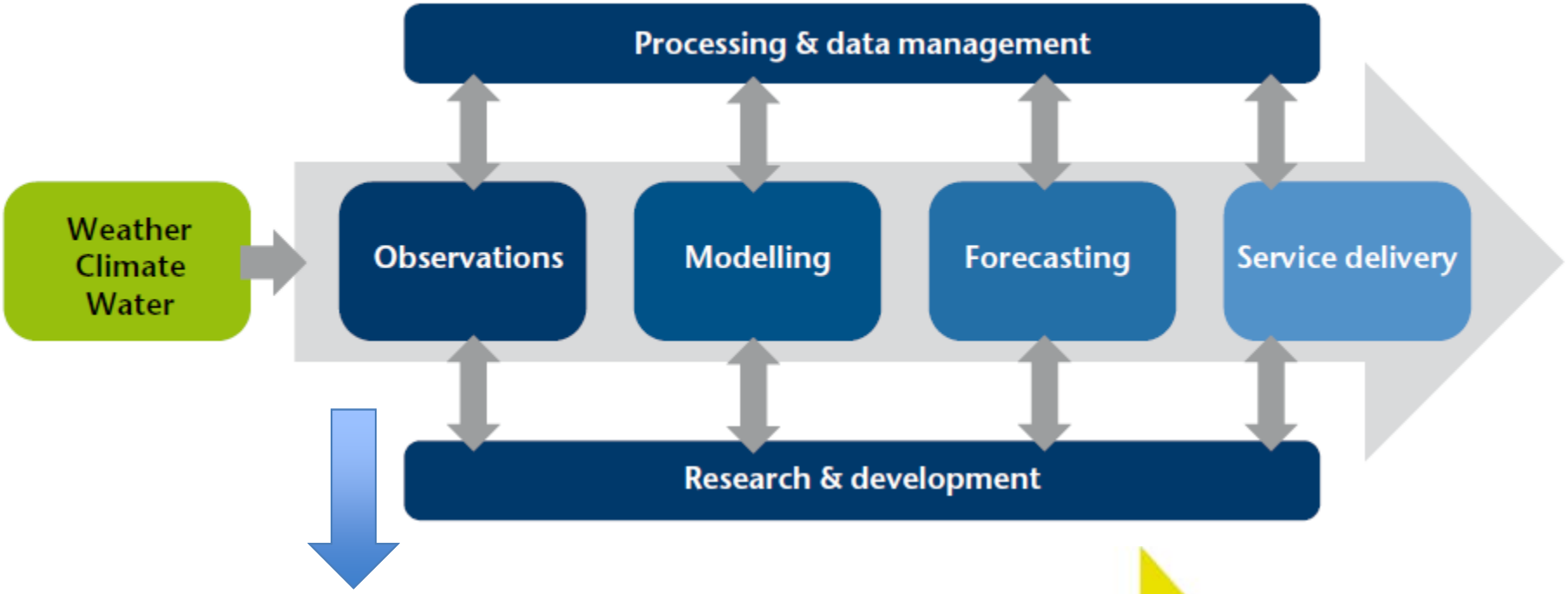
GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

Priority areas

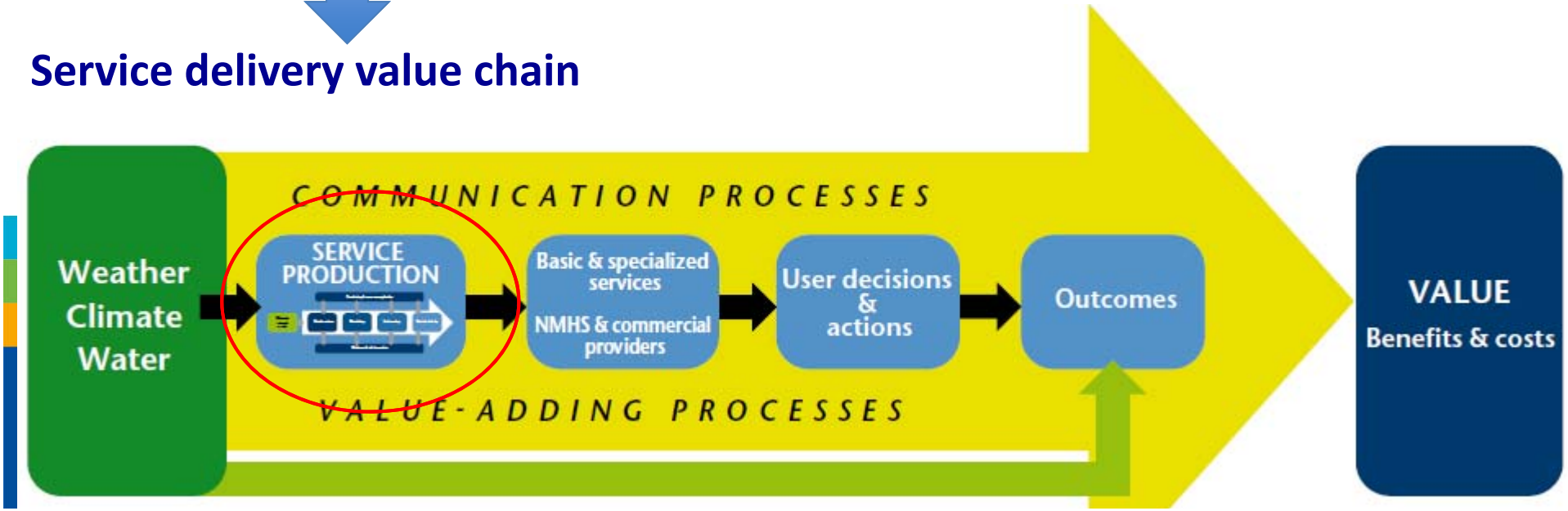
- ✓ Water
- ✓ Disaster risk reduction
- ✓ Health
- ✓ Agriculture/food security
- ✓ Energy



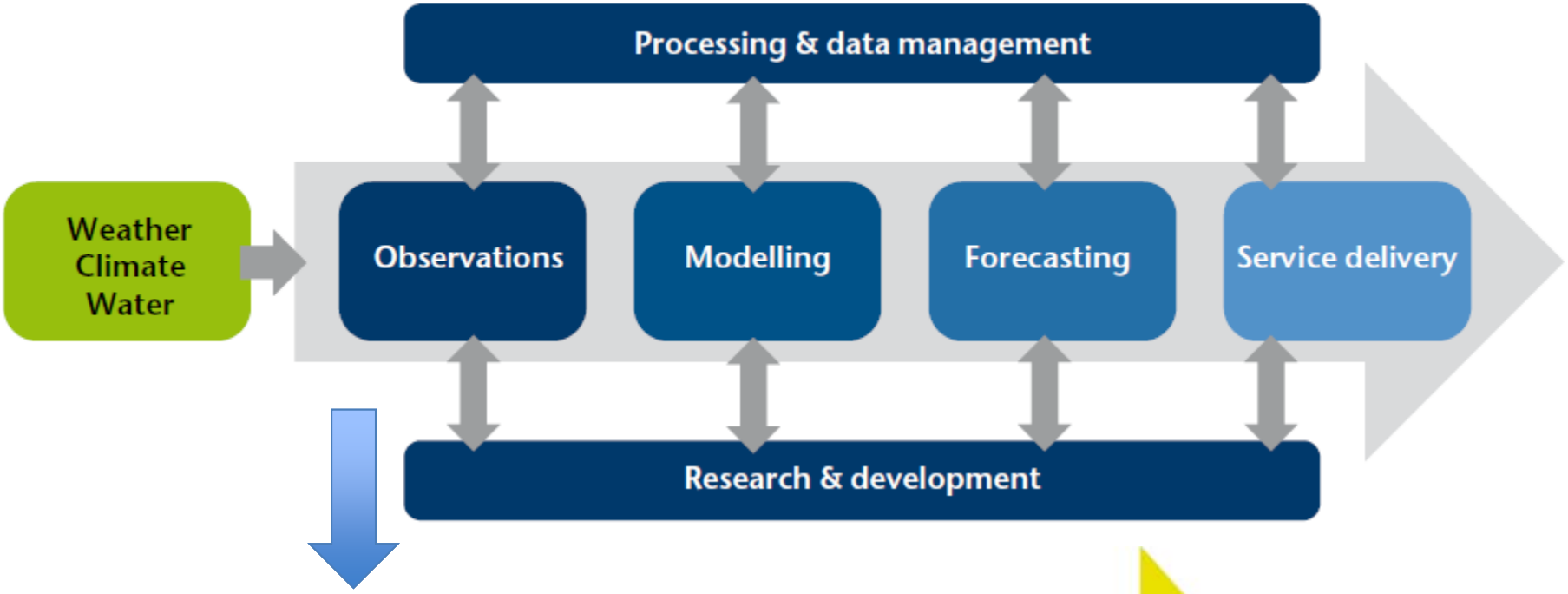
Climate information system



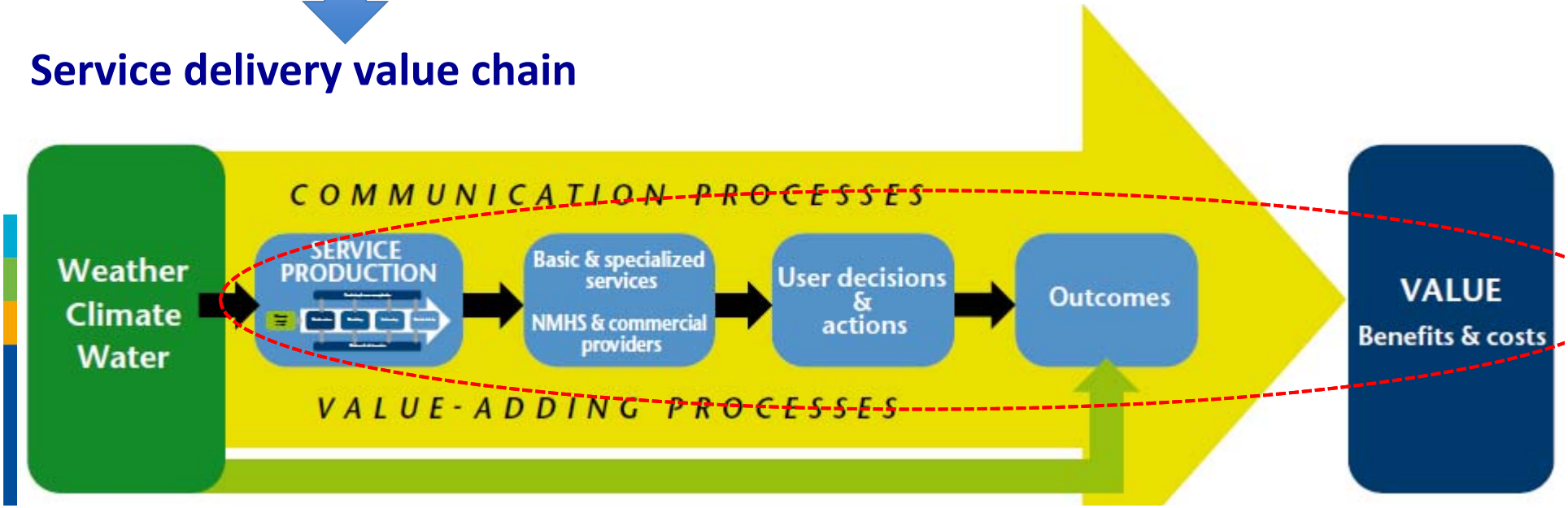
Service delivery value chain



Climate information system



Service delivery value chain



Data requirements for adaptation

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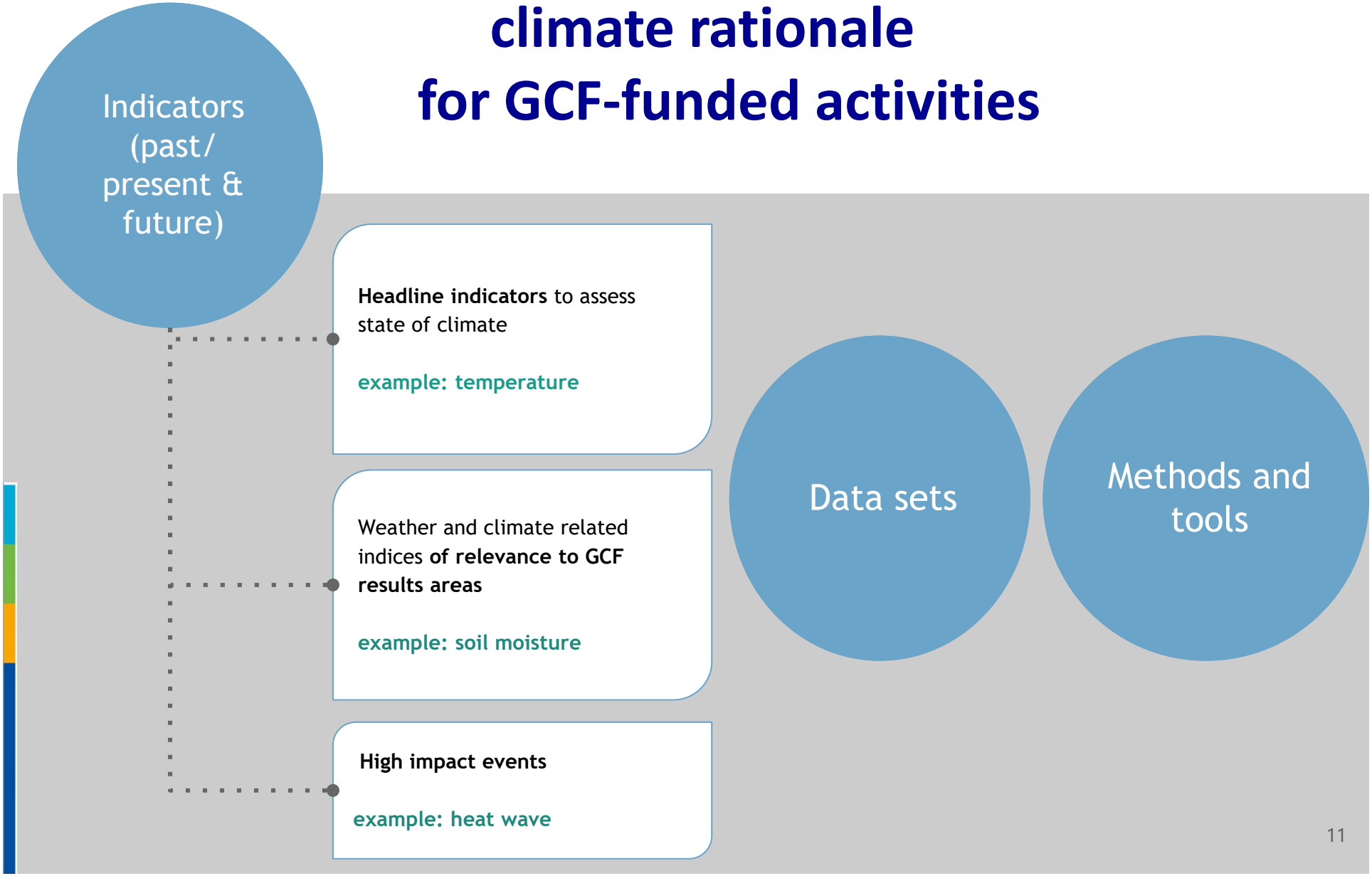
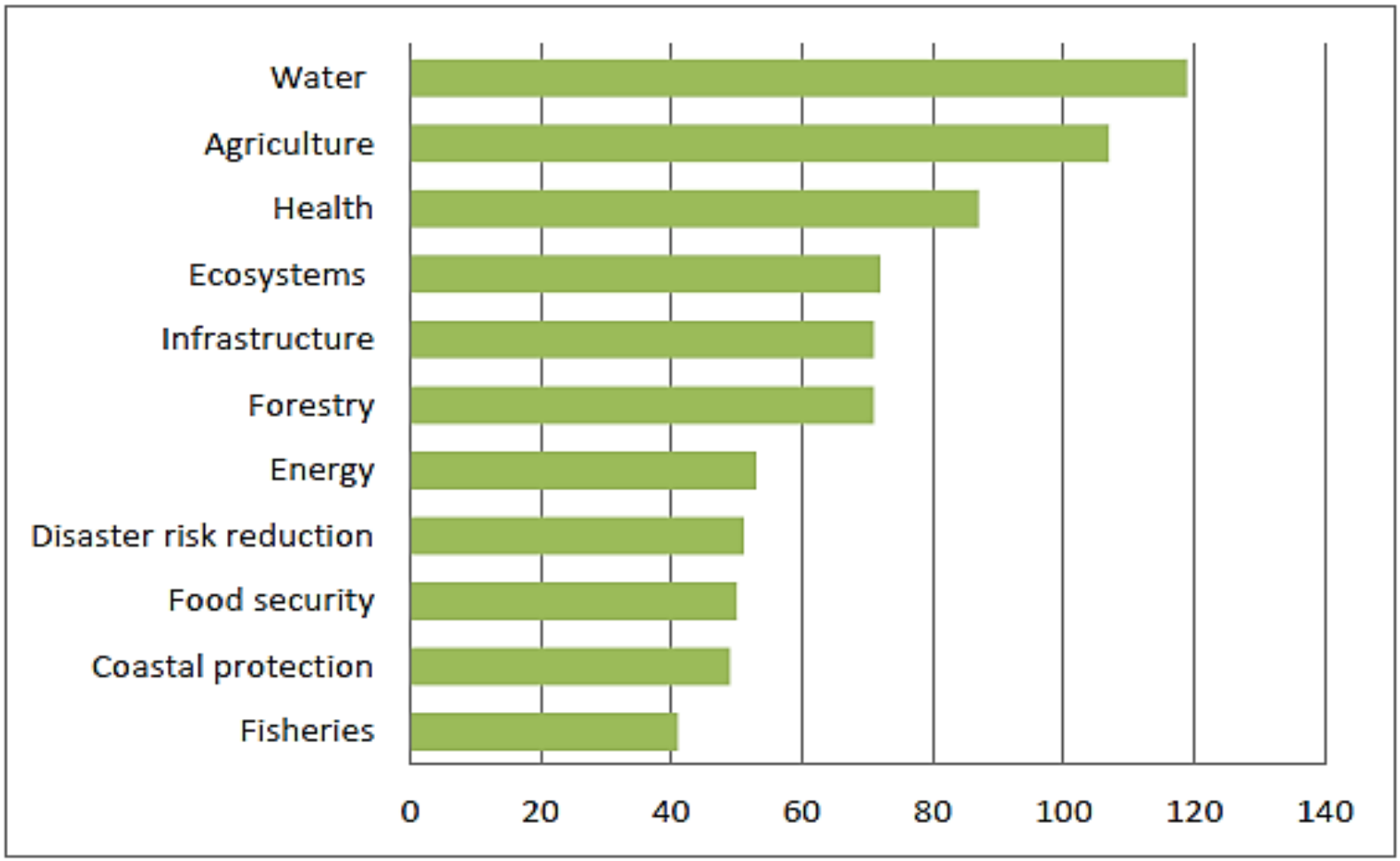
Adaptation planning: WMO-GCF partnership for enhancing the climate science basis of the climate rationale for GCF-funded activities



Adaptation implementation: Climate services for adaptation priorities in NDCs



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Data providers and resources

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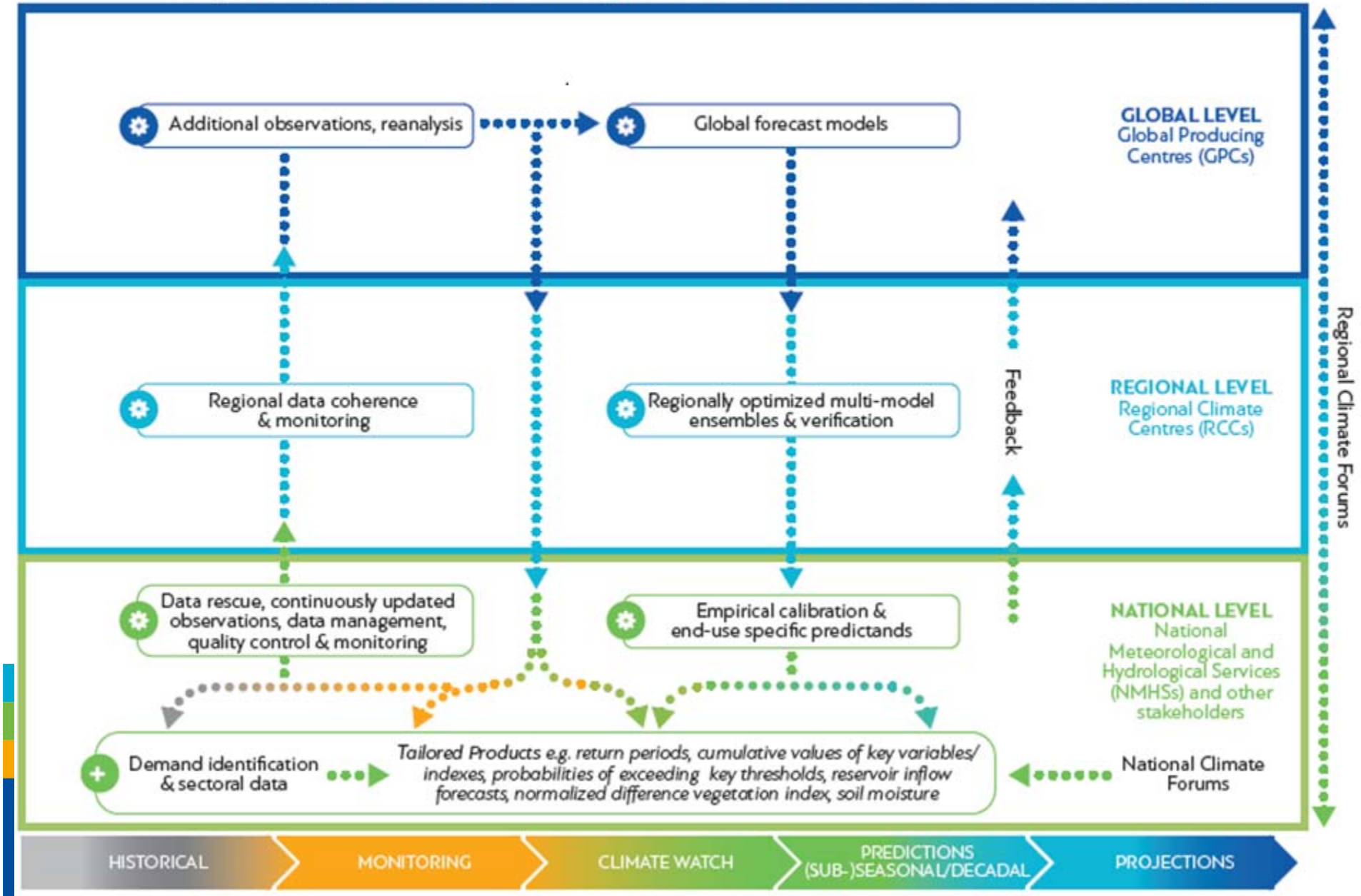
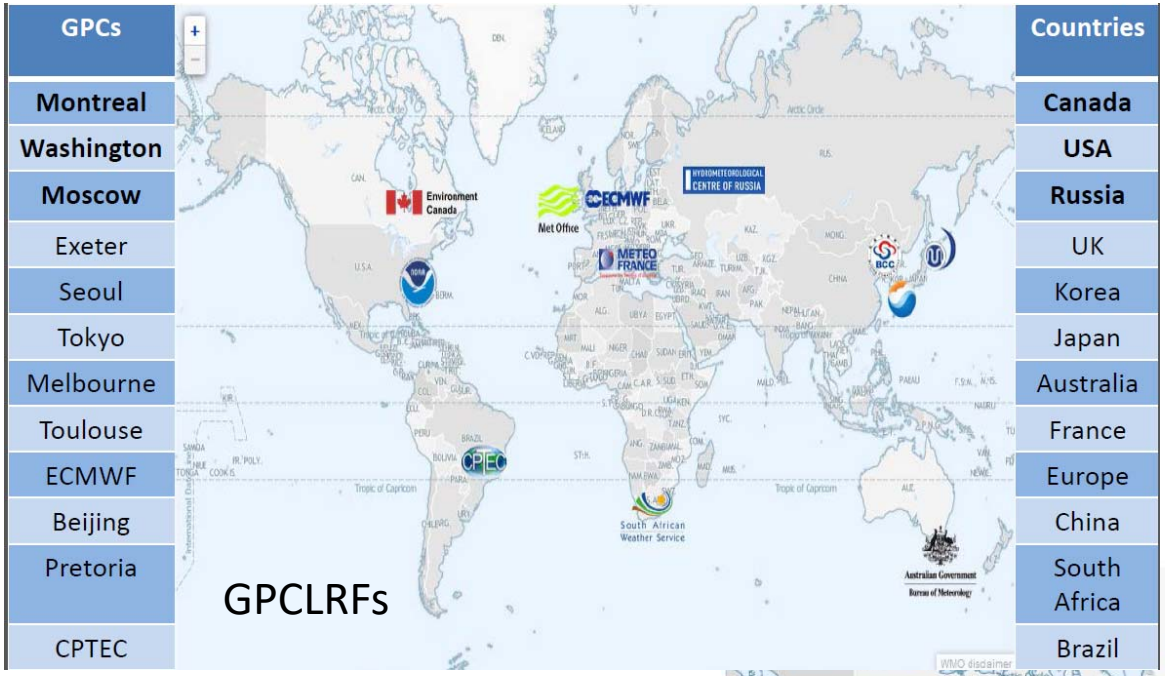
A Regional Approach to Implementing the Climate Services Information System (CSIS-R)



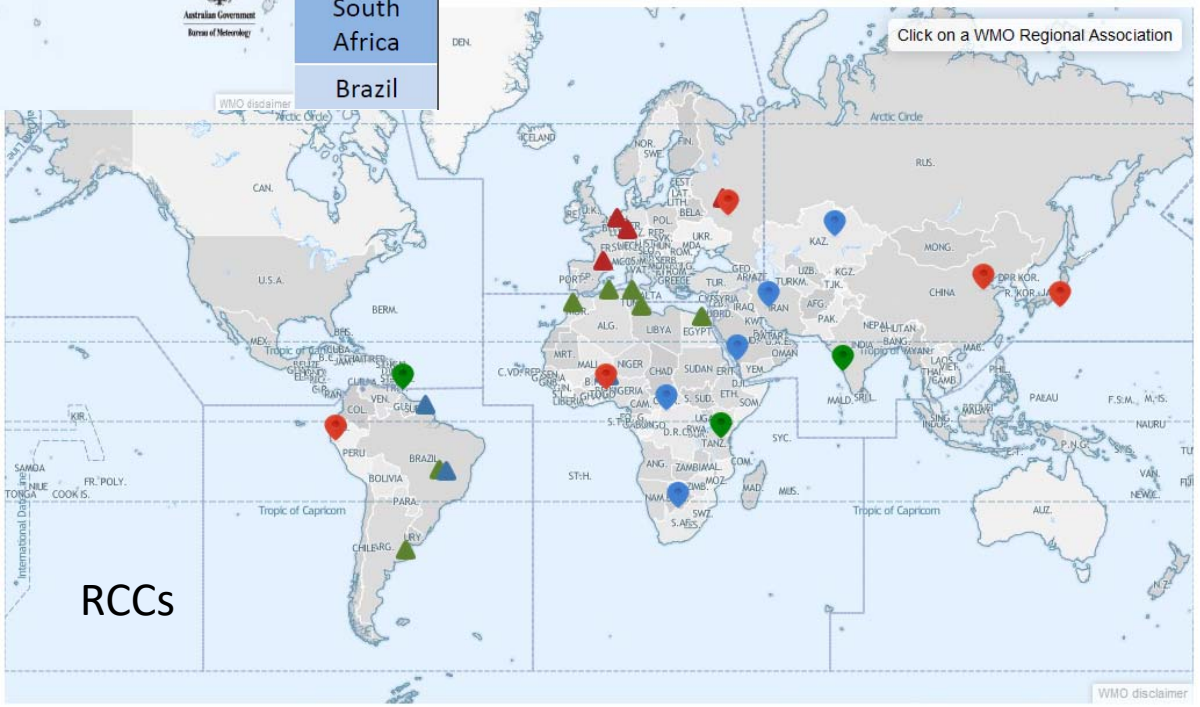
Global operational infrastructure

GPCs	Countries
Montreal	Canada
Washington	USA
Moscow	Russia
Exeter	UK
Seoul	Korea
Tokyo	Japan
Melbourne	Australia
Toulouse	France
ECMWF	Europe
Beijing	China
Pretoria	South Africa
CPTEC	Brazil



GPCLRFs

- Global Producing Centres of Long Range Forecasts
- Regional Climate Centres
- National Meteorological and Hydrological Services



RCCs

Legend

designated RCC
RCC in demonstration phase
RCC proposed
designated RCC-Network
RCC-Network in demonstation phase
RCC-Network proposed

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Current status of availability and access to data and products from CSIS entities

Availability of data and products (Non-exhaustive list)

100 | 1850 | present | S2S | A2D

More than 10 types of proxies (corals, insects, pollen, tree rings, …)

Paleoclimatology proxies
CRU, NOAA

Reconstructed variables
CRU, NOAA

Frequency: Sub-daily, daily or monthly

In situ data

Global	Regional	National
GHCN-Daily	RBSN	BOM CDO
~90 000 stations	~4 000 stations	~16 000 stations

More than 200 variables available from stations

Climate extreme indices
ETCCDI: 27 indices for more than 100 countries
ICA&D: > 50 indices for more than 15 000 stations

Gridded data and gridded merged data
CRU: 0.5° × 0.5°
GPCP: 1.0° × 1.0°
CMAP: 2.5° × 2.5°

Remote sensing data
EUMETSAT, WDC-RSAT: satellite-based data ~few km
NOAA NCEI: radar data ~few km

Atmospheric measurements
6 GAW WDCs: > 1 400 stations

Reanalysis
more than 10 global reanalysis: > 100 km
ERA-Interim, ERA-15, ERA-40, NCEP-NCAR, JRA-55, …
dynamical downscaling of global reanalysis: CORDEX, CaRD10
regional reanalysis: NARR, ASR
~10-50 km

Graphical tools

ENACTS
maps
data: > 30 years, 4-5 km grid

IRI Map Room
maps, graphics, animations, data

ClimatView
station monthly T2m, RR
1982-present, > 2 500 stations

WMO WWIS
station normals T2m, RR
~1 900 stations

Frequency: Daily to monthly

Monthy/seasonal LRF

Global
13 GPCLRFs
2 Lead Centers
APCC
IRI
maps
data ~2.5° × 2.5°
hindcasts ~20-30 yrs
skill scores

T2m, RR, SSTs, MSLP, T850, Z500

Frequency: Monthly

Monthy/seasonal LRF

Regional
8 RCCs
3 RCC-Networks
maps
data ~30 km

T2m, RR

Frequency: Quarterly

Updates

Global
GSCU (Trial)
El Niño/La Niña Update

Major circulation features

Frequency: Once or twice per year

Probabilistic outlook and consensus statement

Regional
19 RCOFs

National
NCOFs

T2m, RR

Frequency: Annual

Annual to Decadal predictions

Global
GPC-ADCP
LC-ADCP
global maps
variables averaged over year 1 and years 1-5
data
time resolution: daily
hindcast data

T2m, RR, SLP, MOC

Updates

Global
GA2DCU (Concept)

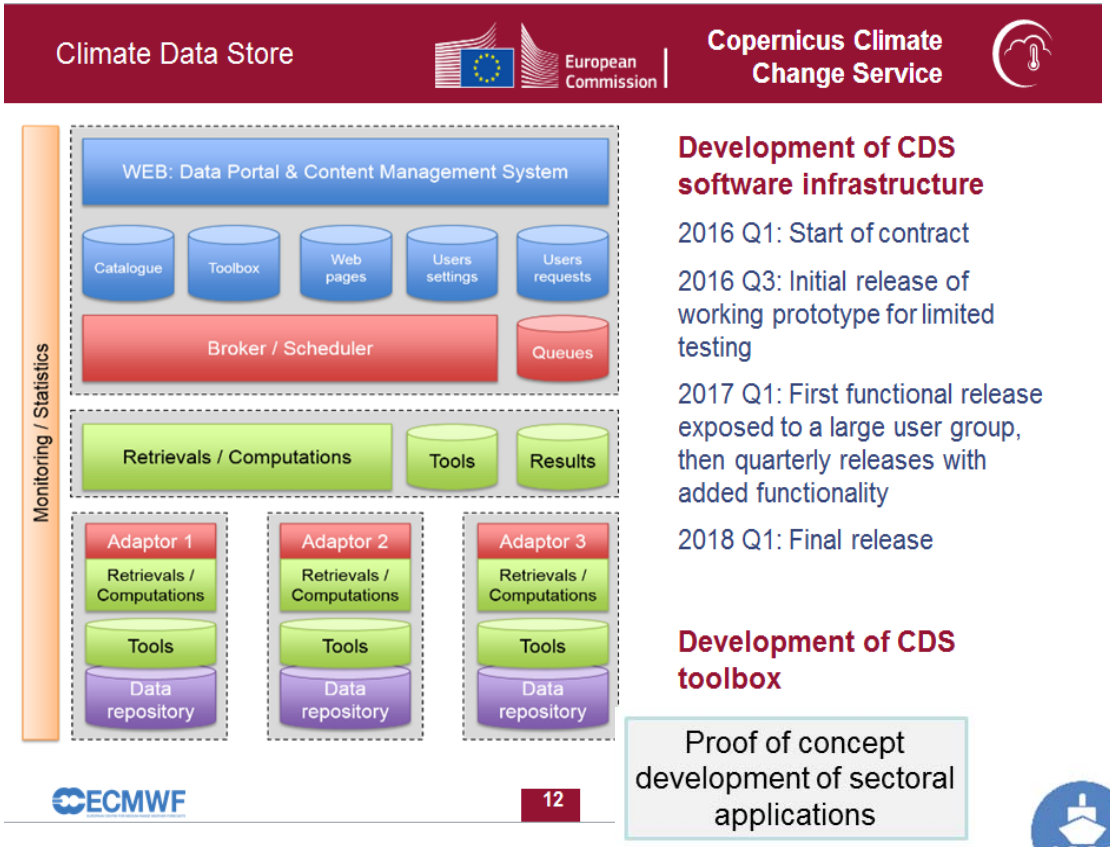
Major circulation features

Climate change projections

CMIP5
61 models
~20-200 km
historical run: 1850-2005
nominal timescale
time period: 2100 and beyond
time resolution: daily

CORDEX
Several global/regional models
14 domains
~12-50 km
nominal timescale
time period: until 2100
time resolution: daily

Structured access to global data and products



Development of CDS software infrastructure

2016 Q1: Start of contract

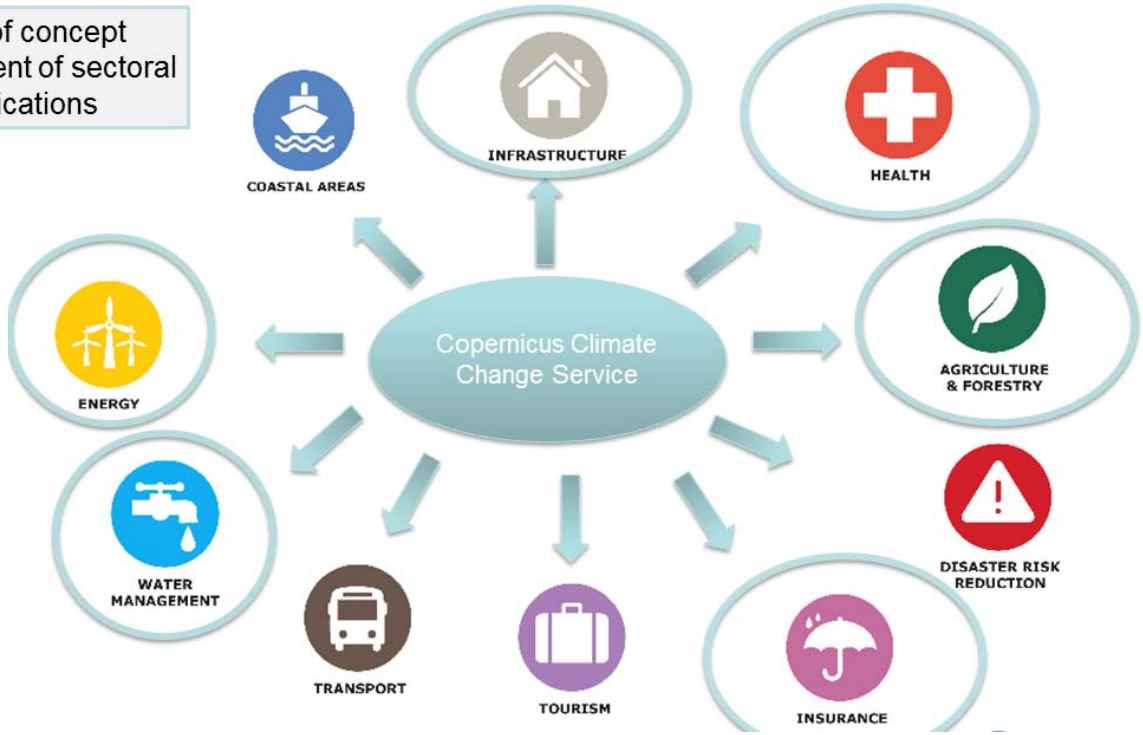
2016 Q3: Initial release of working prototype for limited testing

2017 Q1: First functional release exposed to a large user group, then quarterly releases with added functionality

2018 Q1: Final release

Development of CDS toolbox

Proof of concept development of sectoral applications



- 80 years historical ECV data at 35 km resolution
- Seasonal forecasts
- Climate change projections (initially Europe)

Climate services capacities (109 countries): Basic Systems

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Challenges

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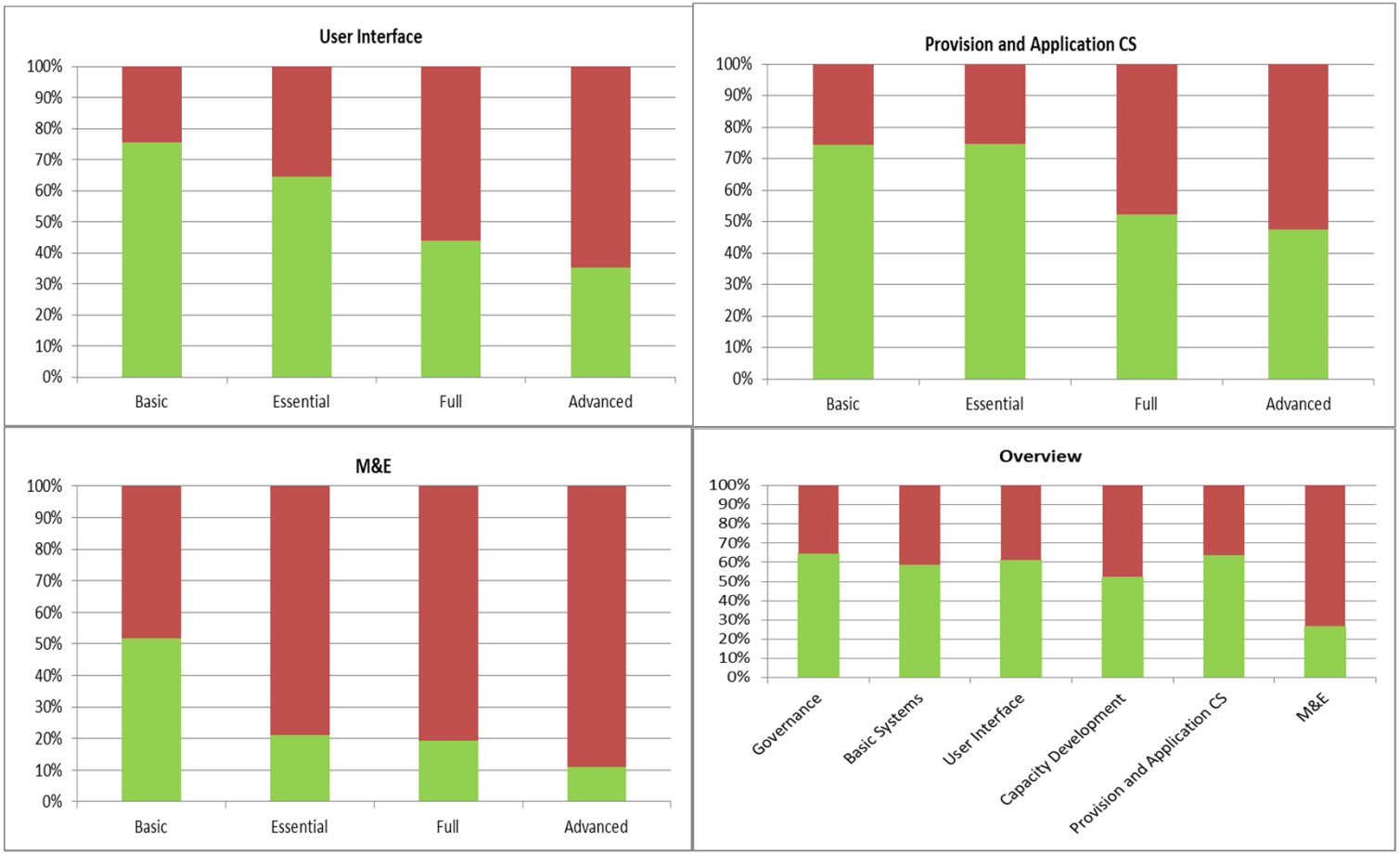
Climate services capacities (109 countries): Service Delivery and Overall



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Summary of estimated disaster effects by sector (million K)

Outcome measurement: Myanmar Post-Disaster Needs Assessment of Floods and Landslides

State/Region	Damage			Losses			Disaster Effects		
	Total	Public	Private	Total	Public	Private	Total	Public	Private
PRODUCTIVE SECTORS[a]	**130,760.0**	**13,346.1**	**117,414.0**	**1,076,536.8**	**--**	**1,076,536.8**	**1,207,296.9**	**13,346.1**	**1,193,950.8**
Agriculture crops	54,252.6	--	54,252.6	335,210.1	--	335,210.1	389,462.7	-	389,462.7
Livestock	7,627.4	--	7,627.4	10,150.5	--	10,150.5	17,777.9	-	17,777.9
Fisheries	299.4	75.0	224.4	305,677.4		305,677.4	305,976.8	75.0	305,901.8
Water Resource Management (Irrigation and Flood control)[b]	13,271.1	13,271.1	--	n.a.	n.a.	n.a.	13,271.1	13,271.1	--
Industry	27,585.7	--	27,585.7	300,191.1	--	300,191.1	327,776.8	-	327,776.8
Commerce	27,723.9	--	27,723.9	125,307.8	--	125,307.8	153,031.7	-	153,031.7
SOCIAL SECTORS	**55,116.8**	**54,975.4**	**141.4**	**3,839.9**	**3,839.9**	**--**	**58,956.8**	**58,815.4**	**141.4**
Health	6,647.9	6,506.5	141.4	1,537.3	1,537.3	--	8,185.2	8,043.8	141.4
Education	48,468.9	48,468.9	--	2,302.6	2,302.6	--	50,771.6	50,771.6	--
INFRASTRUCTURE	**606,589.0**	**97,321.1**	**509,267.9**	**45,470.5**	**1,753.6**	**43,717.0**	**652,059.5**	**99,074.6**	**552,984.8**
Housing	508,079.3		508,079.3	34,153.5	200.0	33,953.5	542,232.8	200.0	542,032.8
Electricity	6,282.3	5,719.8	562.5	623.7	250.8	372.9	6,906.0	5,970.5	935.4
Water and Sanitation[c]	14,805.5	14,805.5	n.a.	936.7	936.7	n.a.	15,742.2	15,742.2	n.a.
Transport	76,175.1	76,042.9	132.1	8,512.6	80.0	8,432.6	84,687.7	76,122.9	8,564.8
Communications	1,246.9	752.9	493.9	1,244.0	286.1	957.9	2,490.8	1,039.0	1,451.8
CROSS-CUTTING[d]	**27.2**	**27.2**	**n.a.**	**23,674.4**	**23,674.4**	**n.a.**	**23,701.6**	**23,701.6**	**n.a.**
Disaster Risk Management	27.2	27.2	n.a.	23,674.4	23,674.4	n.a.	23,701.6	23,701.6	--
Total	792,493.0	165,669.8	626,823.2	1,149,521.7	29,267.9	1,120,253.8	1,942,014.8	194,937.7	1,747,077.0

July-September 2015, Source: World Bank

Solutions

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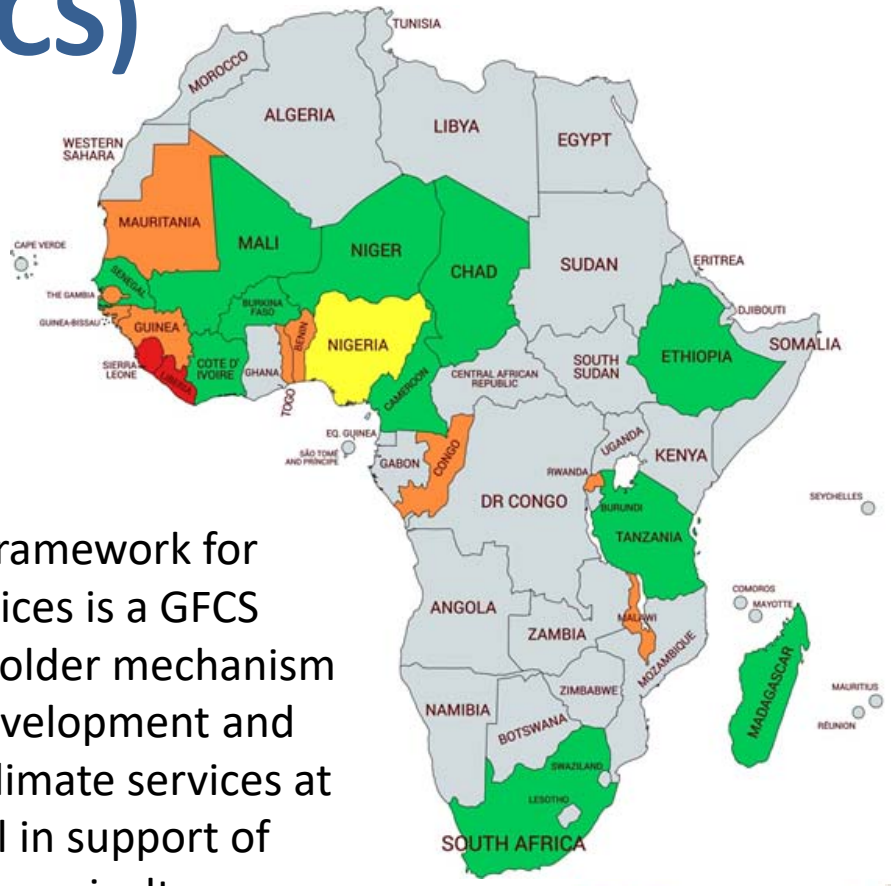
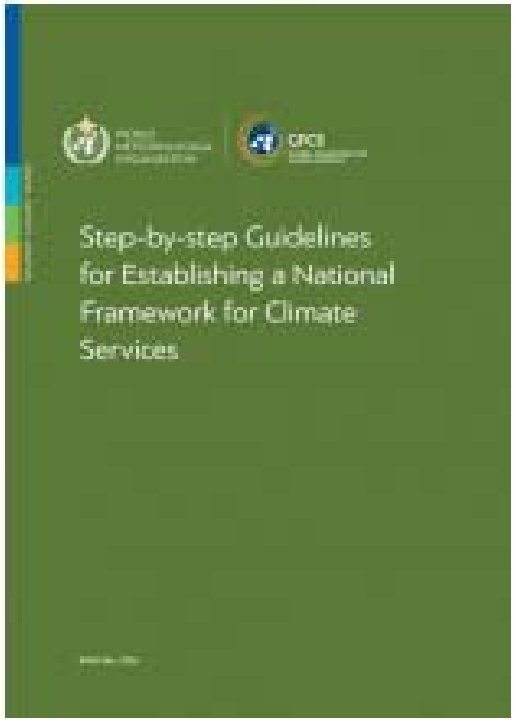
Global Framework for Climate Services (GFCS)





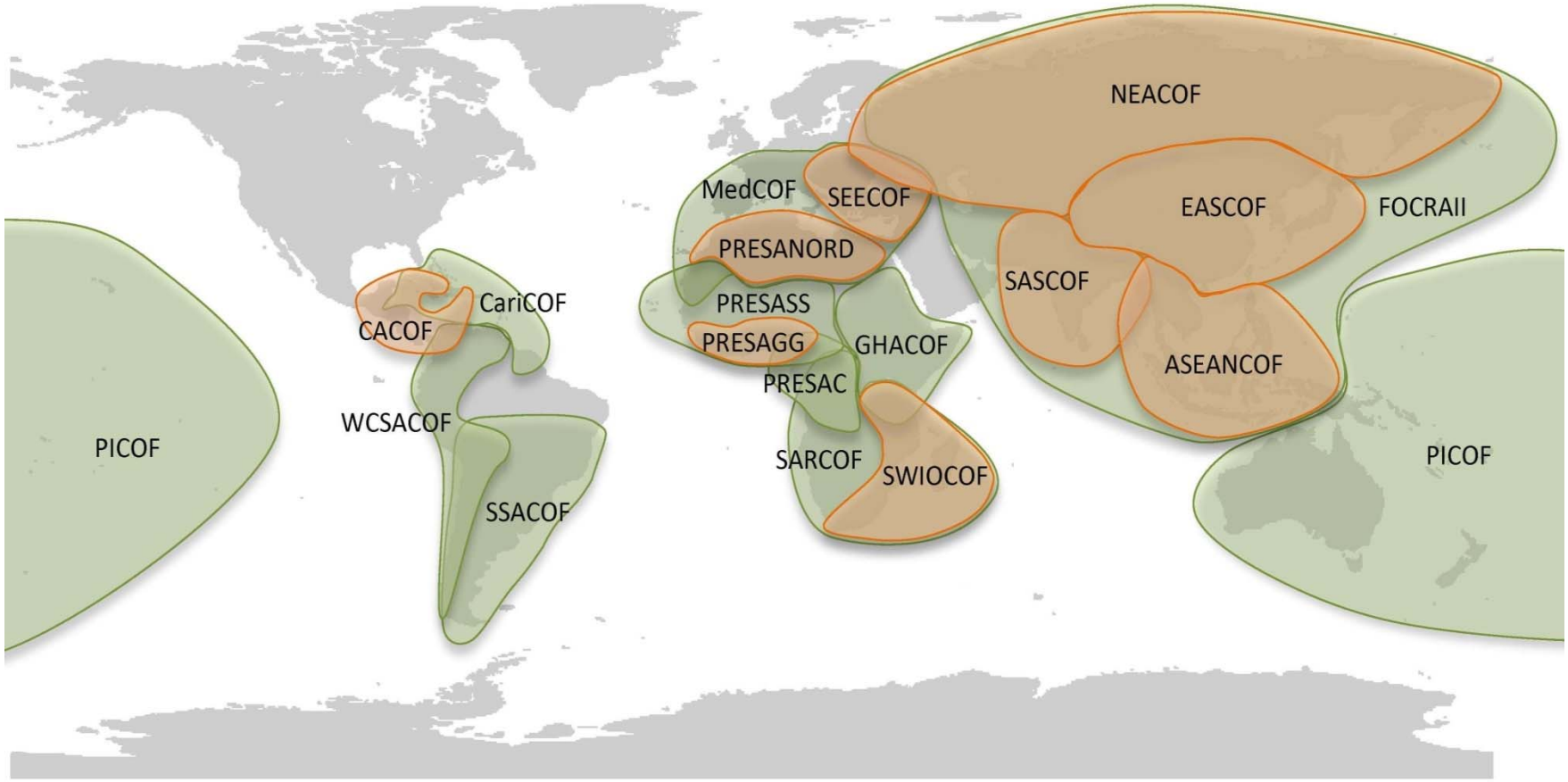
A National Framework for Climate Services is a GFCS multi-stakeholder mechanism to enable development and delivery of climate services at country level in support of adaptation in agriculture, water resource management, health, energy, disaster risk reduction and other climate-sensitive sectors

GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

Status of NFCS Implementation

- Conduct Comprehensive Baseline Capacity Assessment for Development of Climate Services
- Support NHMS to Develop Strategic Plan & Engage in a National Consultation process for Climate Services
- Develop National Action Plan
- Begin Implementation of Action Plan, Launch National Framework for Climate Services
- Countries with NFCS providing advanced services

Regional Climate Forums



https://public.wmo.int/en/our-mandate/climate/regional-climate-outlook-products

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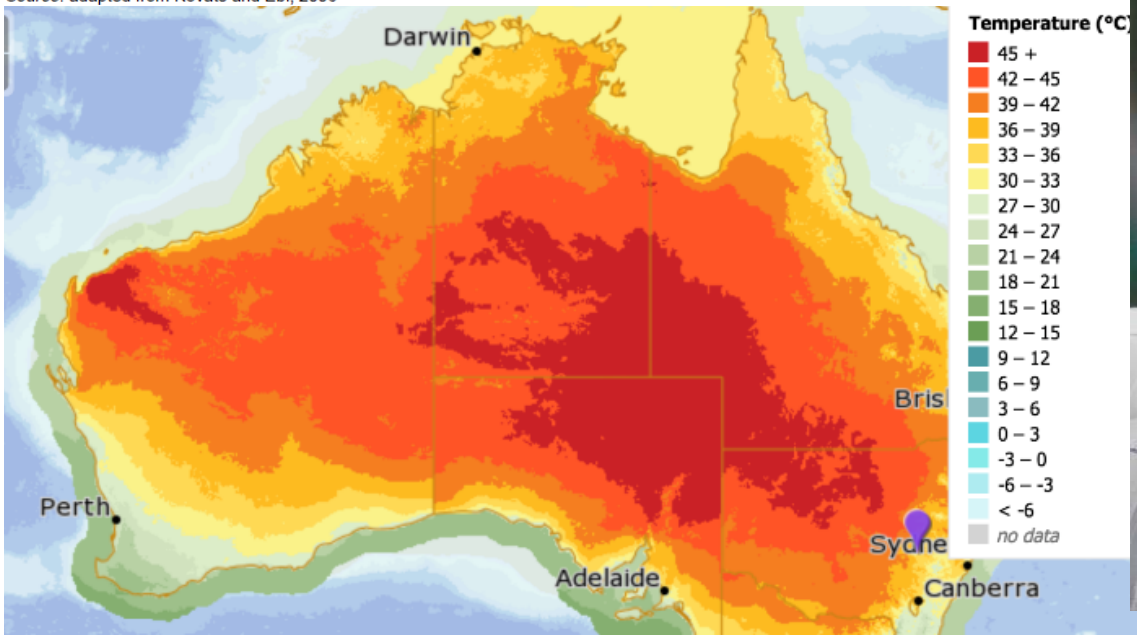
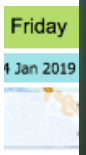
Heat wave health warnings

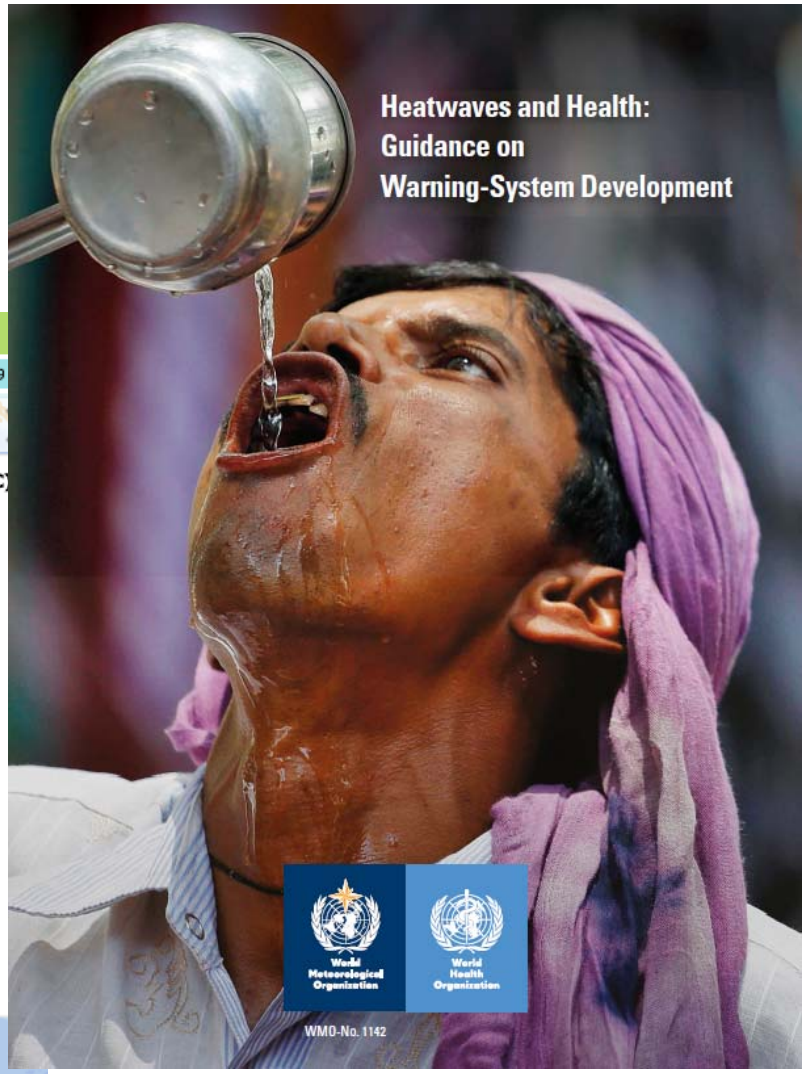
Measures, strategy	*Level of implementation**	*Comments*
Media announcements (radio, television)	+++	Provide general advice on heat stress avoidance to general public.
Bulletin or web page	+++	May be restricted access to relevant professionals or accessible by everybody.
Leaflet	++	General advice and advice for nursing-home managers: often distributed at beginning of the summer via health centres, and places where vulnerable people may be.
Telephone helpline	++	Either a dedicated telephone service is opened (Heatline in Portugal) or people are encouraged to phone a pre-existing general health advice line (NHS Direct in the United Kingdom).
Opening of cooling centres	++	There is some evidence that cooling centres are not used by high-risk individuals but by low-risk individuals.
Alert to hospital emergency rooms, ambulance services	+	Used to improve operational efficiency (need to deploy extra staff): needs to be based on local information and carefully evaluated.
Home outreach visits to vulnerable persons	+	Important but usually expensive: use pre-existing networks of volunteers (buddy system in Philadelphia) or professionals (social workers). Requires a registry of vulnerable people.
Evacuation of vulnerable persons from their homes to cooling centres	+	Using a registry of vulnerable people who are visited at home and evacuated, if necessary.
Outreach to homeless	+	High-risk group in southern USA (11 homeless people died in heatwave in Phoenix, July 2005).
Electricity companies cease disconnection for non-payment	+++	Utility companies have initiated and financially supported HHWSs in the USA. Most important where population relies heavily on air-conditioning (as is the case in the USA).
Water companies cease disconnection for non-payment	+	
Fan distribution	++	Fans are effective when they circulate cooler air, but not above temperatures ~37ºC.

+ rarely implemented, ++ often implemented, +++ implemented very often

Source: adapted from Kovats and Ebi, 2006

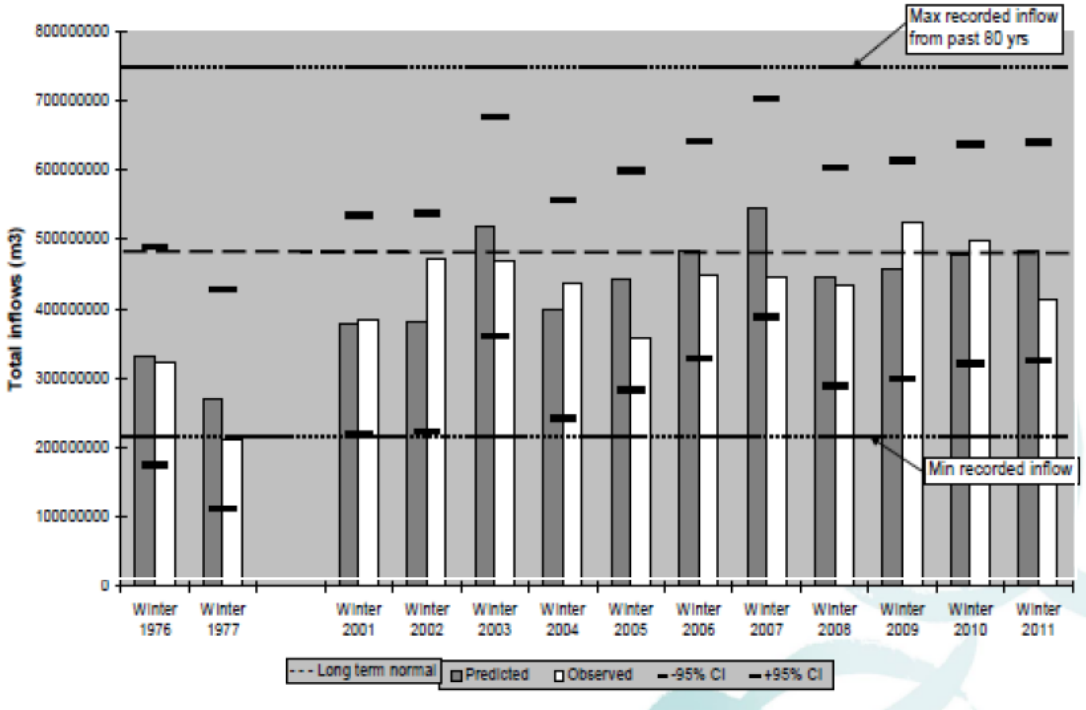






Seasonal inflow forecasts for hydropower resilience: Waitaki reservoir, New Zealand

- Reservoir inflow highly variable: 200 – 750 million m^3/year
- Forecast model run every 3 months to predict inflow over the next 3 months
- Forecasts inputs: El Nino, global pressure and wind patterns, local rainfall
- Forecasted inflow (gray bars) closely matches actual inflow (white bars)

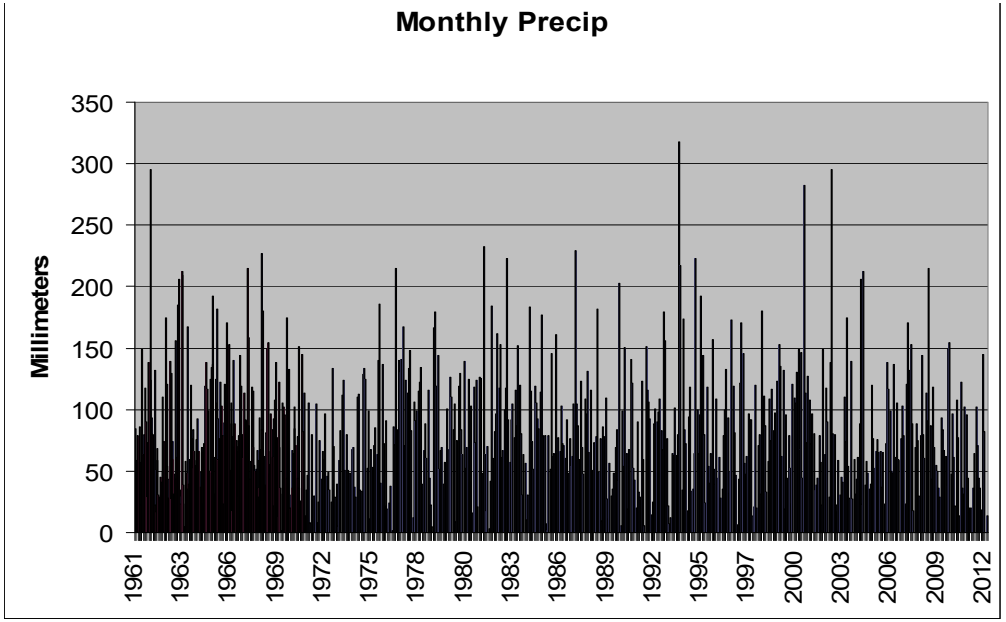


- Reservoir operators can adjust water allocations to balance meeting hydropower generation targets with other priorities e.g. water supply, flood control

Source L. Dubus, EDF, from J. Purdie, Meridian Energy Ltd

Agmet services in West Africa

- Historical Climate Data
- Crop Information
- Basic Soil Information



Crop Advice for Rural Farmers

Simple Crop Model

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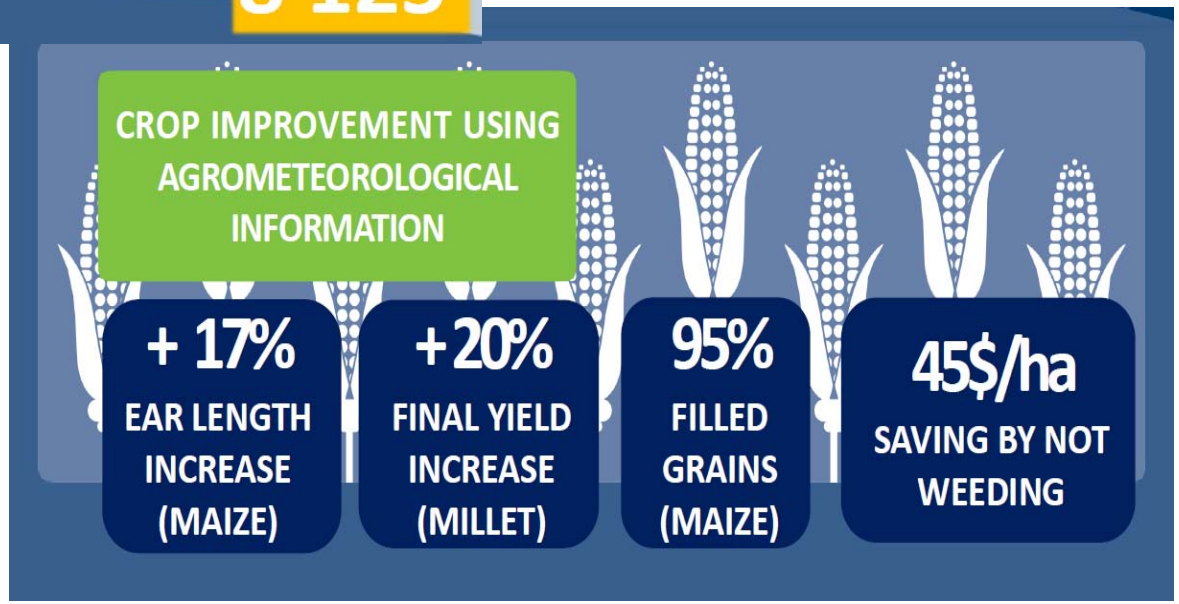
Full value-chain service delivery

Socio-economic benefits



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Recommendations

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For strengthening climate information systems and associated services

- Article 7 country stakeholder engagement

  (country-driven, gender-responsive, participatory and fully transparent; takes consideration of vulnerable groups, communities and ecosystems; and is based on and guided by the best available science)

  – Strengthen scientific rationale for adaptation action

  – Improving and documenting the effectiveness of adaptation measures -> operationalization

  – More systematic assessment of adaptation outcomes and socio-economic benefits

For strengthening climate information systems and associated services

- Targeted research
  - Underlying observations and data
  - Prediction and projections
- More coherent financing for complete systems
  - Fully operational exchange of GFCS-relevant climate data and products among national, regional and global centres supporting country-level service delivery addressing adaptation priorities

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Thank you

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