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Assessing the Socio-Economic Benefits of Meteorological and Hydrological Services

Glen Anderson, Chief of Party
Climate Change Resilient Development Project
Montego Bay, Jamaica
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Climate Services
Partnership

What I will cover

- Background on weather, climate and hydrological services
- Motivation for SEB studies
- Survey of SEB studies
- Preview of the SEB book

Weather, climate, and hydrological services

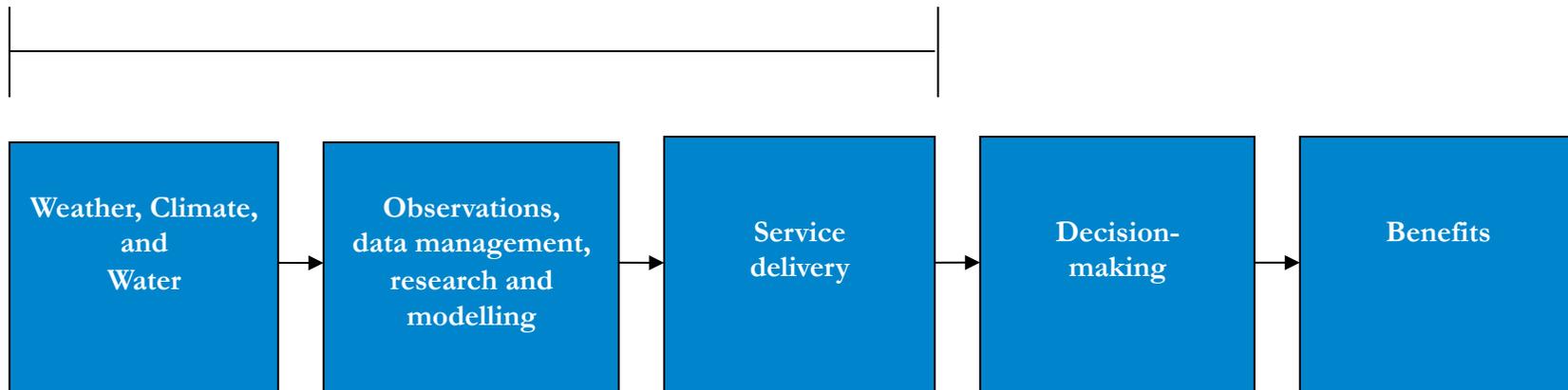
- Meteorological services:
 - Information and advice on past, present, and future state of the atmosphere including:
 - Temperature, rainfall, wind, cloudiness, air quality
 - Weather phenomena such as tropical cyclones, storms, floods, and droughts
 - Includes “weather” and “climate” services
- Hydrological services:
 - Information and advice on past, present, and future state of rivers, lakes, and other inland waters, stream flow, river and lake levels, and water quality
 - Focus is on surface component of the hydrological cycle

Weather, climate, and hydrological (WCH) services

- WCH services can be categorized in terms of the following:
 - Type of service provided
 - Meteorological and hydrological variables provided
 - Phenomena involved
 - Method of service delivery
 - User communities served
- Organization of services:
 - National Meteorological Services (NMSs)
 - National Hydrological Services (NHSs)
 - National Meteorological and Hydrological Services (NMHSs)

Delivering WCH service benefits

10 billion USD globally for NMHSs



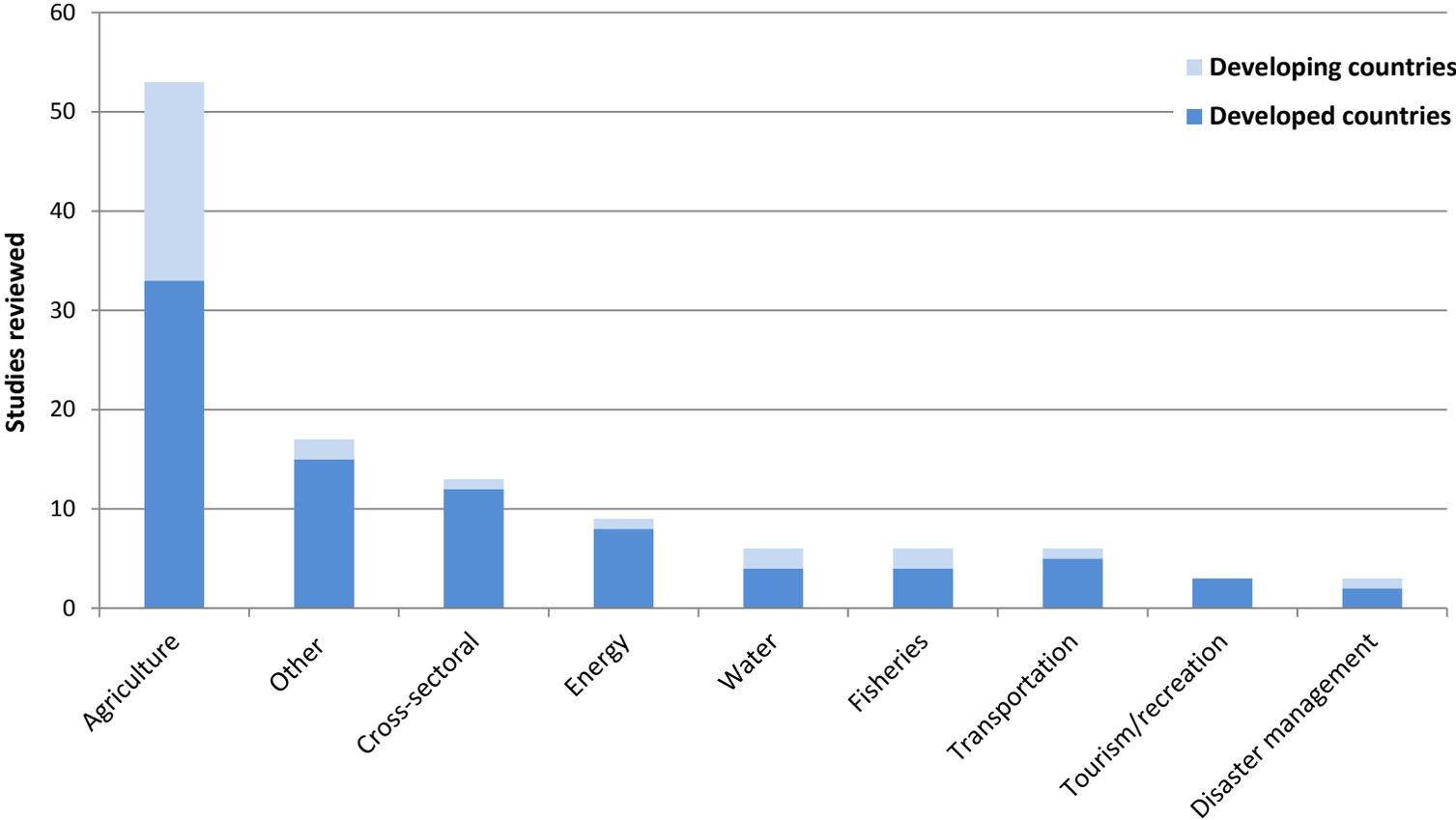
Benefits of WCH services

- Two primary types of benefits:
 - Avoided costs and damages:
 - Physical assets – buildings, infrastructure, vehicles and equipment
 - Harm – injury, illness, mortality
 - Benefits due to decisions informed by information and services
- Benefits accrue to:
 - Individuals and households
 - Businesses and public/private service providers (e.g., schools, hospitals, water, wastewater, energy, transportation, telecommunications)

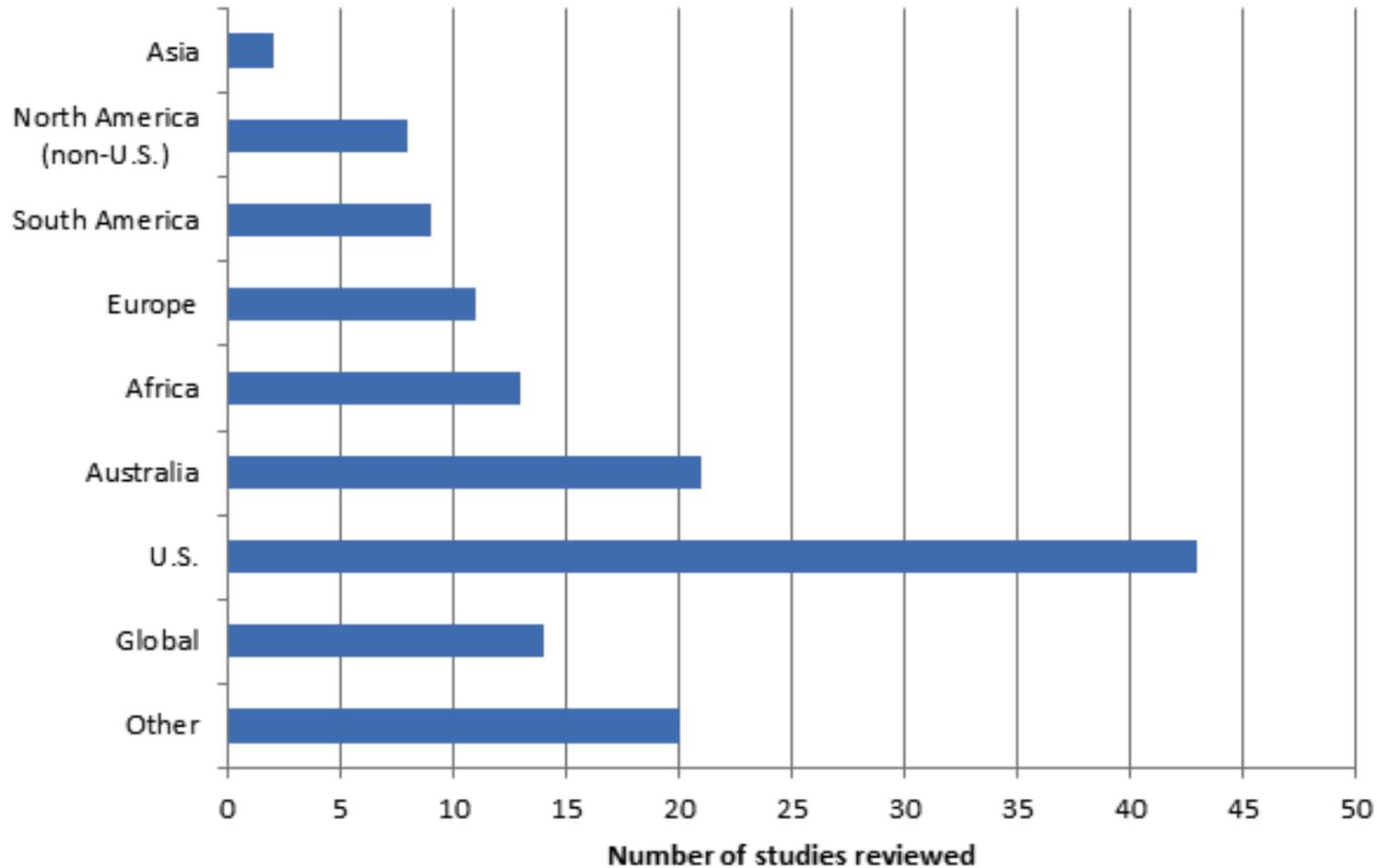
Motivation for SEB Studies

- NMHS Budgeting
 - In the past, WCH services understood to generate benefits greater than costs
 - As costs have increased, NMHSs required to justify expenditures in terms of benefits of their services
- Changes in services
 - Ex ante studies: adding a new service; expanding or improving an existing service
 - Ex post studies: determining if an existing service has yielded benefits greater than the costs of the service
- Diffusion of services
 - Input to inform awareness campaigns and educational programs

Literature Survey: Distribution by Sector



Study Characteristics: Geographic Distribution of Studies



Example Benefit Estimates – Agricultural Studies



Farm level

- \$0.44 – 0.85 in willingness-to-pay by households in Zimbabwe for improved seasonal forecasts
- \$9-35 per acre by adjusting crop mix to ENSO phase in Argentina

Regional/National

- \$1.1 million in annual benefits for Australian farmers in Merredin region with forecasting technology that provides 30% decrease in seasonal uncertainty
- \$10 million annually for Mexico economy with use of ENSO early warning system by farmers

Sector-level

- \$36 million in benefits to Canadian hay production with daily precipitation forecast
- \$1.1 billion in losses to U.S. agriculture from incorrect 2000 drought

Global/National

- Global annual value of ENSO phase information in agriculture ranges from \$399 million to \$556 million to \$1,390 million.
- Global value of climate prediction approximately \$900 million



Example Benefit Estimates – Other Sectors

Energy

100% increase in net weekly income for wind energy producers in Europe with medium-range forecasts

\$1 to \$6.5 billion in decadal hydropower benefits for Ethiopia with perfect ENSO-based precipitation forecast

Fisheries

\$902,000 in average annual total welfare benefits related to Pacific Coho salmon fishery with use of perfect ENSO forecast.

Transportation

\$11 million in avoided costs of carrying extra fuel for Qantas Airlines in Australia due to improvements in terminal aerodrome forecast information

\$56.1–60.1 million in avoided costs to Swiss economy with use of weather services in the transportation sector

Other

Households willing to pay \$25–41 per year for tropical cyclone service in Australia

\$468 million in avoided fatalities from Philadelphia's heat watch/warning system from 1995 - 1998

Water

Up to \$11.6 million in annual welfare benefits with perfect ENSO forecasts in the Northern Taiwan regional water market

\$100-350 million in annual benefits to Georgia in drought years with use of water management strategies based on precipitation index forecast.

SEB Book

- Working title: “Assessing the Socio-Economic Benefits of Meteorological and hydrological Services”
- Collaboration of the WMO, WB, and CSP with USAID funding
- Objectives:
 - Provide a rigorous foundation and practical guidance for designing, implementing and communicating the results of climate services
 - Increase awareness of SEB
- Audience:
 - Policy-makers, researchers, and practitioners in these disciplines
 - Meteorologists and Hydrologists
- Schedule – Final draft for production by Summer 2014