Identifying and enhancing socioeconomic value of Integrated Urban Services

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Structure

- What are integrated urban services
  - concept
  - WMO context
- Value chains in IUS
  - Structure / Content / (Creation)
- Hazards and climate change in urban areas
- Example of socioeconomic appraisal of IUS

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Describing Integrated Urban Services

Concept

IUS entails the provision of weather, climate, hydrology and air quality data, observations and predictions intended to support traditional as well as new urban services, and may include tailoring to enhance usefulness and uptake of the IUS product. These services may be provided directly by NMHSs or indirectly through partners in public and private agencies.

The portfolio may be further extended, e.g. regarding soil condition

WMO context

WMO IUS Study Group prepared already 2 guidance documents titled:
Guidance on Integrated Urban Hydrometeorological, Climate and Environmental Services

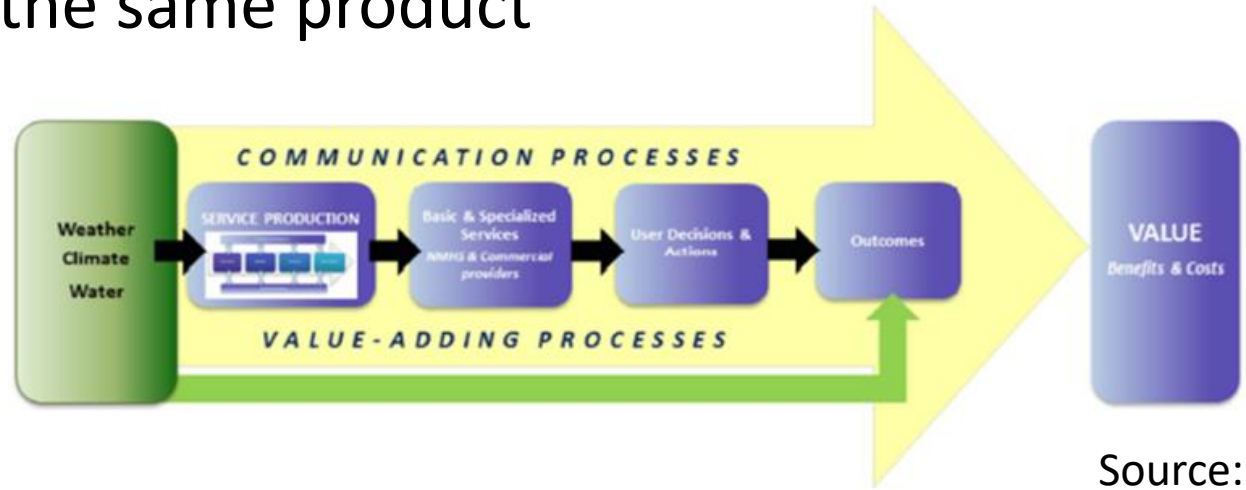
- Volume I: Concept and Methodology
  https://library.wmo.int/index.php?lvl=notice_display&id=21512#.YwNuDd-U9ZI
- Volume II: Demonstration Cities
  https://library.wmo.int/index.php?lvl=notice_display&id=21855#.YwNuvd-U9ZI

This presentation is based on support work for the 3rd report on the ***value of IUS***

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Value chains

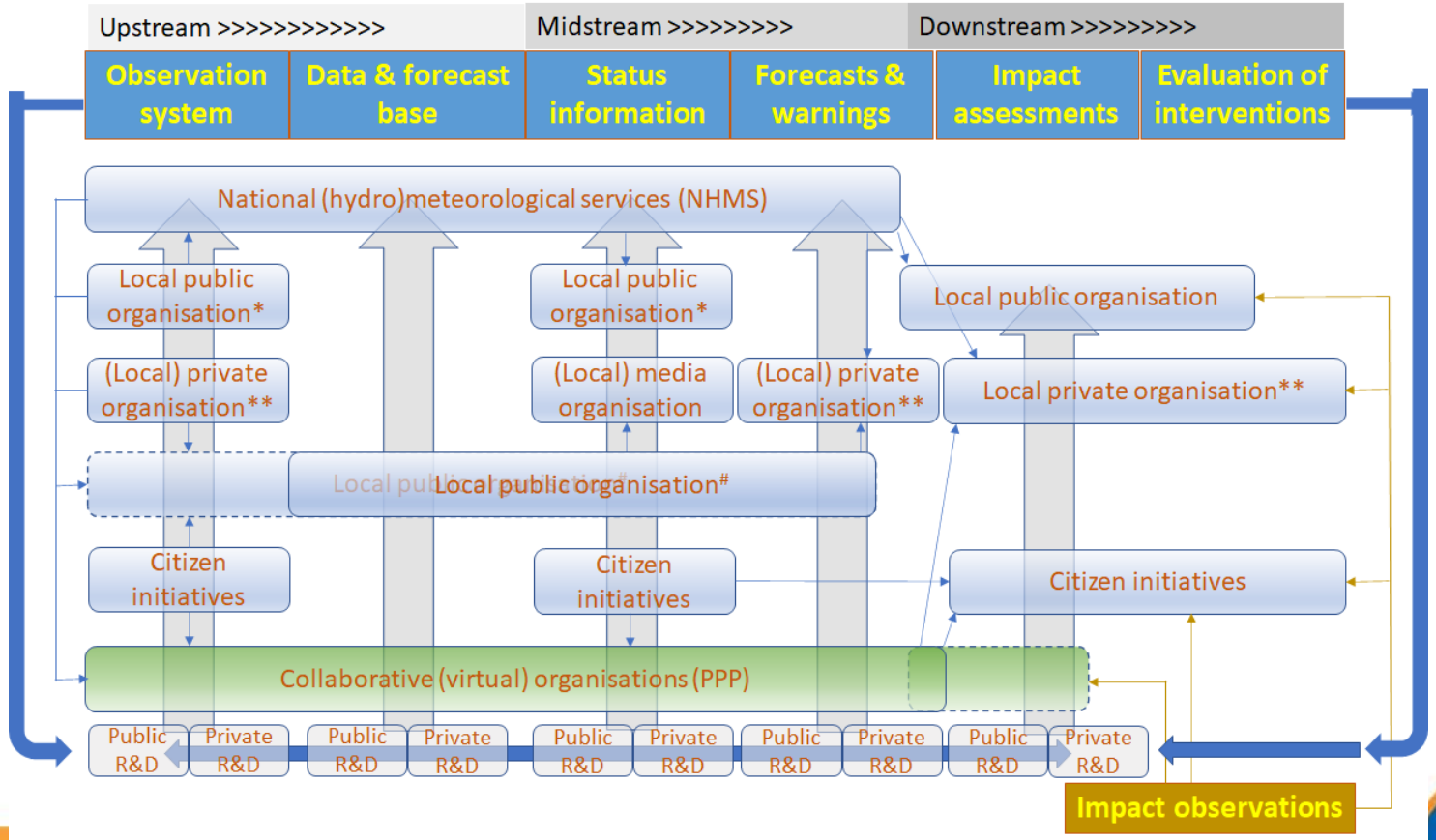
- a tool to display and analyze how the production of a good or service is generating value, notably in terms of stages of production and the contributing factors.
- usually displayed as a unidirectional sequence of production stages, in practice value chains can be more complicated, including lateral and feedback connections; alternative value chains are possible for the same product



Source: WMO 2015

Value chains

- Oversight for better coordination and integration
- Support for devising a appropriate deployment service model
- Recognize the value of non-meteorological input

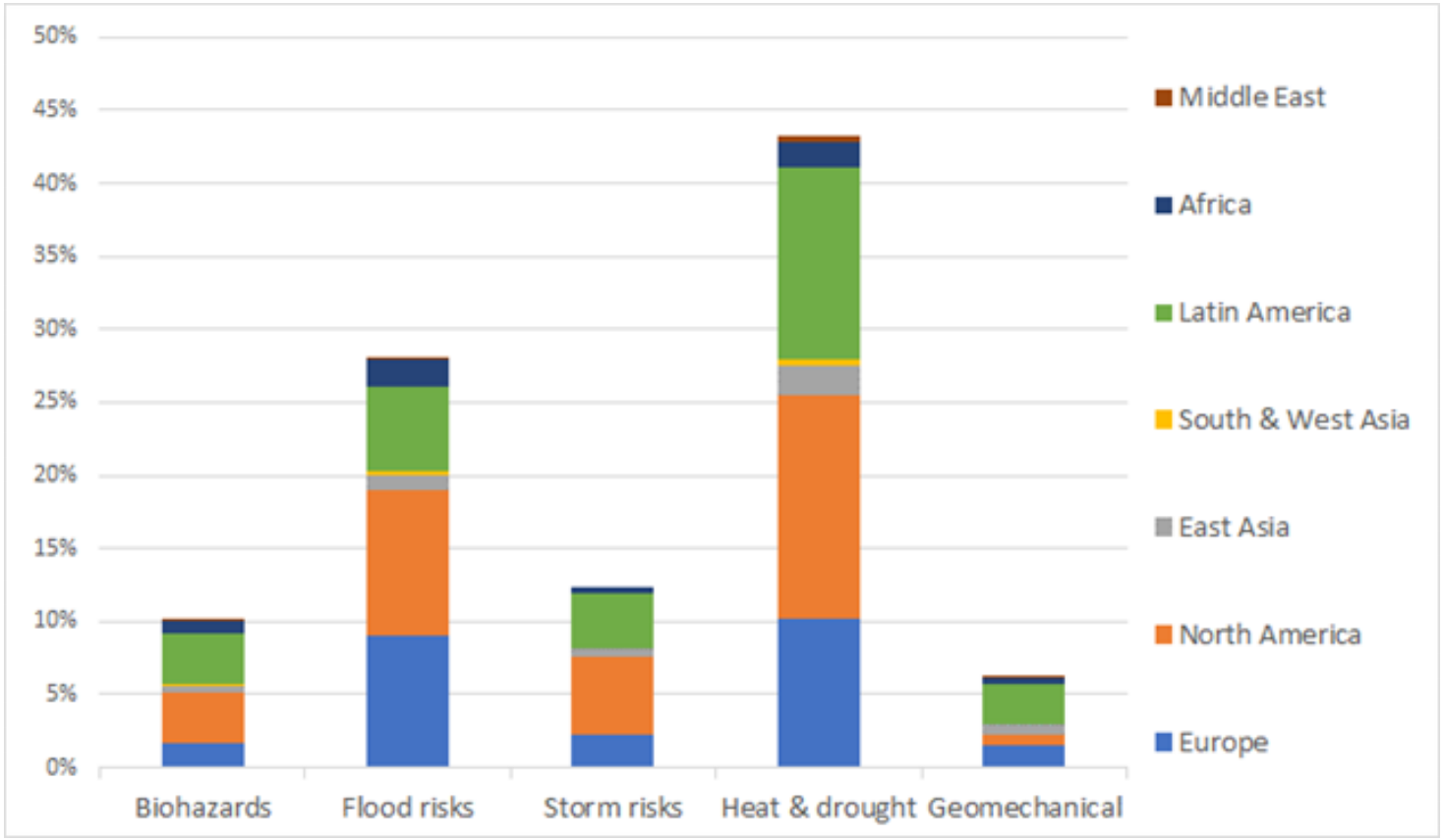


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Value bases

- **Economic**
  - Private – e.g. net monetary profit
  - Societal – e.g. net social benefit (monetized, weighed, ….)
- **Social**
  - Public health – e.g. morbidity and mortality rates, hospital patients
  - Livelihoods – self-reliance; participation rates
- **Environmental**
  - Ecosystem service enhancement (volume indicators)
  - Biodiversity protection
- **Informational**
  - Academic / Enlightment / Empowerment – access, use, ..
  - Innovation potential – business use & spin-offs of IUS

Hazard occurrence in cities by continent

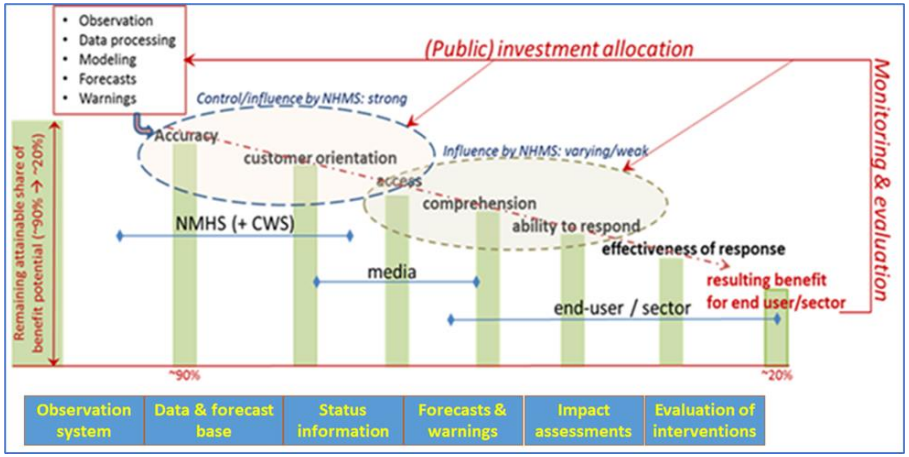


The relative shares of different hazard categories as part of all reported hazards in 829 cities by continent (based on ICLEI/CDP 2021 survey data; Perrels & Berninger 2022)

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Valuation of hypothetical urban heat stress warning service

hypothetical case of (sub-)tropical coastal city) based on real world data on heat stress effects & measures



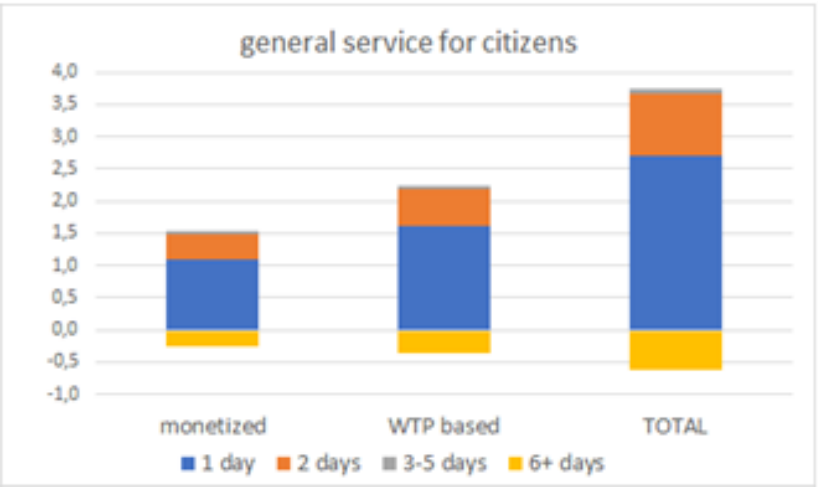
number of days ahead	accuracy	customer orientation	access	comprehension	ability to respond	response effectiveness	**risk reduction effect**
1	0,97	0,80	0,90	0,90	0,70	0,50	**22 %**
2	0,95	0,85	0,93	0,90	0,80	0,55	**30 %**
3-5	0,93	0,75	0,95	0,90	0,85	0,60	**30 %**
6+	0,88	0,65	0,97	0,90	0,85	0,60	**25 %**

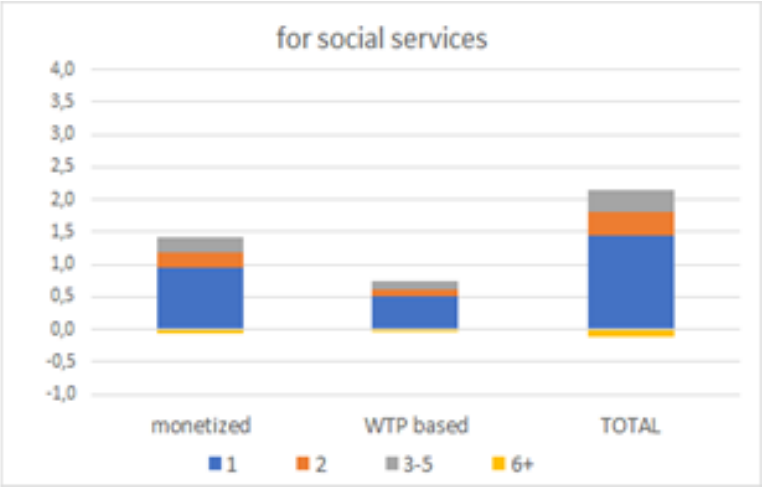
Categories of impacts from heat stress		**monetary cost (M) $**	**well-being cost (WTP) $**	**M Total (mln. $)**	**WTP Total (mln.$)**
A	not feeling well, limited abiity to conduct (domestic) work, but no serious ailments	30	25	1,101	1,610
B	modest levels of (home) care needed, cold shelter service needed	70	35	1,488	2,176
C	professional (home) care needed at regular intervals	150	75	1,522	2,225
D	hospitalization needed, risk for fatality	350	2500	1,274	1,863

From:
Perrels & Berninger 2022

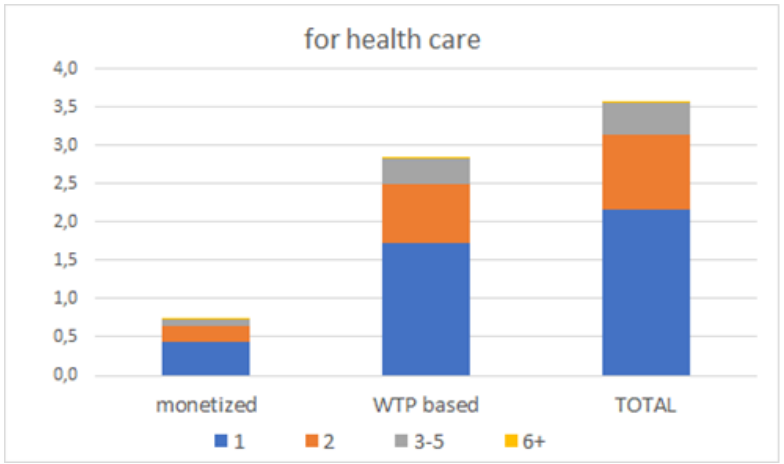
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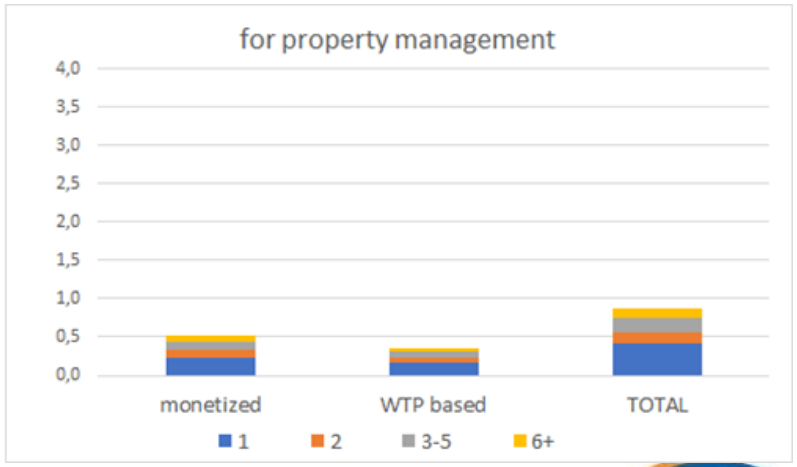
Estimated monetized benefits of heat stress EWS





monetized and WTP based benefits for the general citizens-oriented service (left) and for the city's social services (right)





monetized and WTP based benefits for the health care-oriented service (left) and for property managers (right)

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Conclusions and next steps

- The **value chain** is a fitting concept for assessing value generation in weather services
- Only outlining the value chain however does not suffice for actual valuation; additional tools are necessary – the value chain offers a kind of work bench to conduct deeper analysis
- The value chain can also be used in a qualitative mode - as an improvement identification tool for service quality management
- Technical forecast quality is a prerequisite for value generation, but the eventual value depends a lot on (fitness for) contextual factors

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Conclusions and next steps

- The value does not have to be monetized, and even monetization can be based on different methods
  - Health effects (QALY, morbidity, mortality)
  - Assistance actions
  - WTP based monetization (welfare / wellbeing oriented)
- Value to be estimated by type of use of the service (i.e. shelters, health care, property management, …)
- Mitigation of health effects scores usually high both in monetized and non-monetized terms
- In IUS expansion of *collaborative service models* is very likely – NMHSs should prepare for that

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References

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