Using Climate Information to Guide Adaptation Research and Decisions

Climate change is unequivocal. There is ample evidence from around the globe that changes have already occurred and this reality is forcing decision-makers to evaluate the potential impacts, risks, vulnerabilities and opportunities that climate change presents.

The term **adaptation** refers to all processes, actions and strategies that allow individuals, communities, and organizations to cope with, manage, and adjust to changing climatic conditions such that risks are minimized and opportunities are seized. The development of adaptation plans and actions to adjust to a changing climate requires decision-makers to increase their understanding of climate information. However, given the complexity of climate science, climate change information often remains difficult to understand by many users.

In 2016, Ouranos (a consortium on regional climatology and adaptation) developed the 2nd edition of the **Guidebook on Climate Scenarios: Using Climate Information to Guide Adaptation Research and Decisions**. The Guidebook addresses some of the main challenges adaptation practitioners often face in using climate information. The goal is to increase their capacity to better understand climate information, better evaluate their own climate information needs, and become more critical of the information that is provided to them.

Part of the challenge in incorporating climate information into an adaptation framework or into a decision-making process is deciding what type of climate information is needed. In order to familiarize decision-makers with climate information and its different uses, the Guidebook offers a simple categorization framework that divides climate information into three levels: **basic**, **intermediate** and **detailed**.

The table above provides examples of common climate information formats (i.e. the way in which the information is presented, or the layout of the information) for all three levels. The Guidebook provides in-depth explanations of each of these three categories and their various information formats.

CATEGORY	TYPE OF CLIMATE INFORMATION COMMONLY PROVIDED	EXAMPLES OF COMMON CLIMATE INFORMATION FORMATS
BASIC	Historical trends and future mean changes over large spatial and temporal scales and for simple climate variables	Synthesis tables Climate normals Historical trends (station data, homogenized climate records) Delta changes: Map of projected global changes Map of projected regional changes
INTERMEDIATE	Future changes or future absolute values of more complex climate variables over finer spatial scales	All formats from the basic category + Spatial analogues Scatter plots Map of projected future values Evolution of future values Cumulative distribution function
DETAILED	Future changes in means, absolute values and extremes over finer spatial scales	All formats from the basic and intermediate categories + Temporal series Analysis of extremes –IDF curves Analysis of low-confidence climate indices and events

Case Studies of Climate Information Use in Adaptation

The Guidebook provides real-world examples of each level of climate information. For example, the development of a warning system prototype for low flows and excessive water withdrawals on the Yamaska River watershed in southern Quebec is a project that falls under the **detailed** category. The objectives of the project were to raise awareness of both the public and decision-makers to current low flow vulnerabilities and the misuse of water during summer periods, and to assess the impacts of climate change on low flows in order to start developing adaptation strategies.

The project involved the construction of a website where real-time river discharges and 7-day forecasts could be consulted and compared to low flow indices during the summer period. The project proposed to link each low flow index to a set of water use restriction measures. Selected cities along the Yamaska watershed would remain free to implement the restrictions when the flow falls below these indices.

Real-time river flow data is measured by the *Centre d'Expertise Hydrique du Québec* while the forecast and the low flows indices are based on observed discharge data. The impacts of climate change on future discharges were assessed by importing the outputs of regional climate models into the hydrological model *Hydrotel*, an impact model. The results show that longer and more severe low flows are expected for this watershed in the future.

This project is a good example of how to introduce climate model data into projects at the municipal government level. While the issue of water management has been an important one for the watershed-based organization of this river, this project is bringing the issue to a larger audience. More specifically, the warning system prototype is used to raise awareness and make a better use of the resource. The climate change assessment results will be helpful in speeding up the adaptation process.

Key Messages

The Guidebook provides 12 key messages for the interpretation and use of climate information:

1. Take the time to properly evaluate your needs regarding climate information.
2. Interaction with climate service or information providers is of utmost importance throughout the planning or decision process- make sure that the provider understands your issues.
3. Seek advice and guidance from climate service providers and/or boundary organizations if the level of complexity of the information you seek is beyond the current capacity of your organization.
4. The same climate information can be presented or tailored using different formats – work in collaboration with climate service providers to find a format that works best for your specific needs.
5. Choosing the most adequate information product and format can ensure that the information is well understood and hence used most efficiently.
6. All types of climate information can be equally valuable – basic information can inform decisions just as well as detailed information.
7. Do not rely solely on the mean or median scenario – the range (i.e. the uncertainty) in model projections should always be considered.
8. There is no such thing as the best climate scenario – the use of an ensemble of simulations is crucial.
9. Understand the limitations of the climate information used and make sure the information is interpreted correctly.
10. The natural variability in the climate is valuable information– use it to put the projected changes into perspective.
11. Finer spatial resolution is not always needed and does not always yield better information.
12. The relative importance of sources of uncertainty varies over time and therefore impact the decision-making process differently.

To view the complete Guidebook, please visit:
www.ouranos.ca/publication-scientifique/Guidebook-2016.pdf

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"The Guidebook was first published in the fall of 2014 and has since proven to be a useful tool of reference for both the climate change adaptation community and for those wanting to communicate climate information to decision-makers."