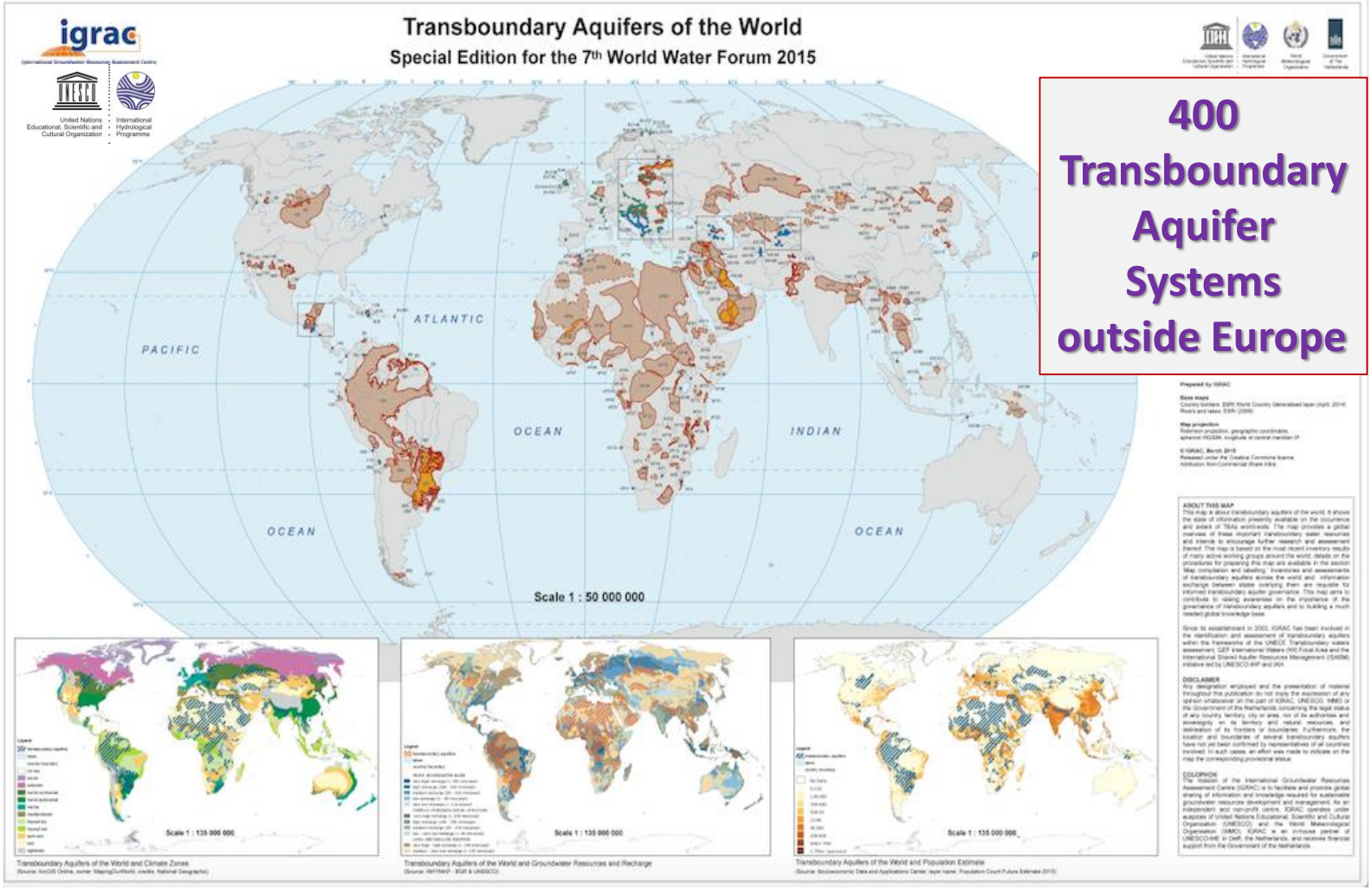
United nations conference on climate change
COP21/CMP11

GROUNDWATER & CLIMATE CHANGE



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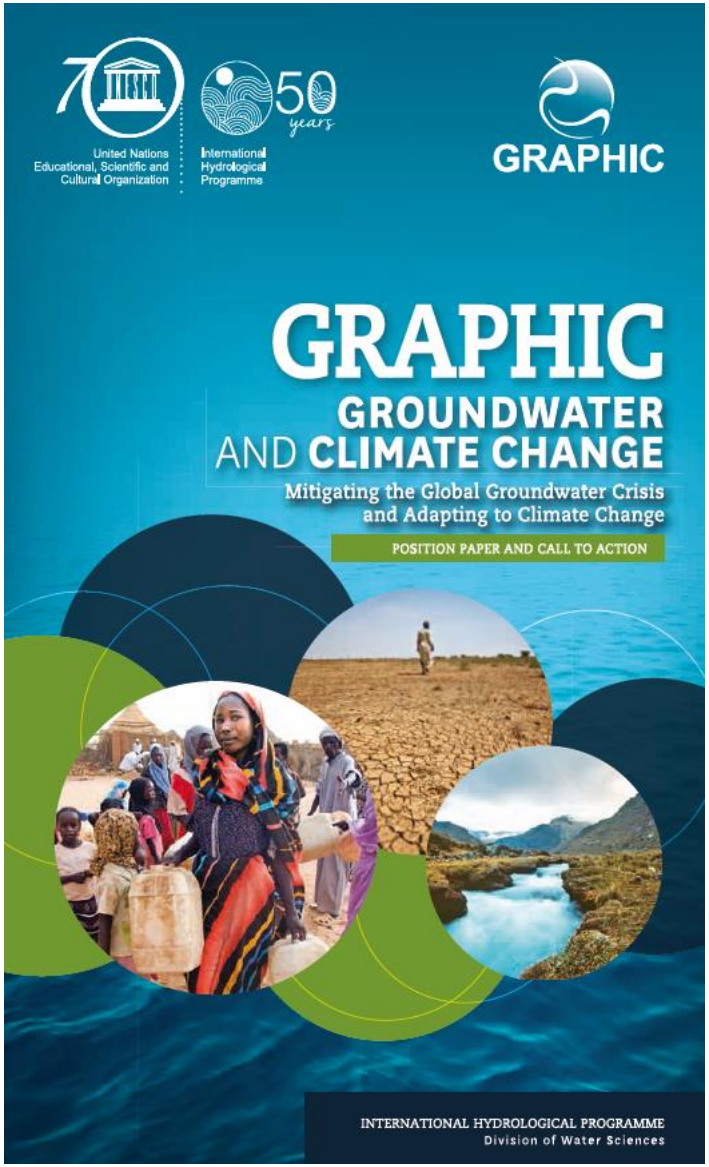
International Hydrological Programme (IHP)

Paris Pact side-event on
"Adaptation to climate change in the basins of rivers, lakes and aquifers"
Room 9, Climate Generations Areas – Paris Le Bourget
1 Dec. 15h00-16h30

GROUNDWATER & CLIMATE CHANGE



INTERNATIONAL CLIMATE NEGOTIATIONS – NEED FOR MORE EXPLICIT DISCUSSIONS REGARDING GROUNDWATER

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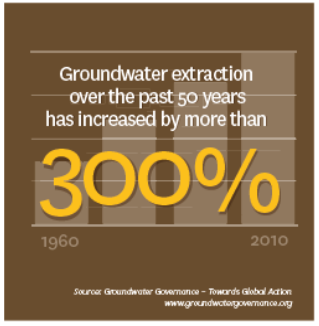
- Groundwater provides drinking water to at least 50% of the world's population and 43% of all the water used for irrigation.
- Groundwater sustains the base flow of rivers and important aquatic systems.
- Sustainable groundwater is an issue of national and international security.
- Groundwater systems are highly vulnerable on Small Island Developing States (SIDS).

- ROLE OF GROUNDWATER IN ADAPTATION TO CLIMATE CHANGE
- GROUNDWATER MANAGEMENT STRATEGIES TO REDUCE VULNERABILITIES



Groundwater is a critical resource for adaptation to climate variability and climate change

- Groundwater provides a unique buffer during extended dry periods.
- Knowledge is fragmented regarding climate change impacts on groundwater quality.
- Science policy is needed to better quantify groundwater withdrawal and sustainable yield.
- Support for adaptation should take precedence in developing countries.
- Programs that empower women and advance gender equality are needed.

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Groundwater a key resource for adaptation strategies to climate change

- Many efforts to **reduce greenhouse gas emissions** depend on reliable access to sustainable water resources.
- **Managed Artificial Recharge** can be used to enhance storage and treatment of water in aquifers (Gale, 2005).

CHALLENGES: can groundwater be affected by climate change?

- Groundwater is **resilient to short climatic fluctuations** but in the long-term can seriously be affected by climate change directly through changes in replenishment (recharge) and indirectly through changes in groundwater use.

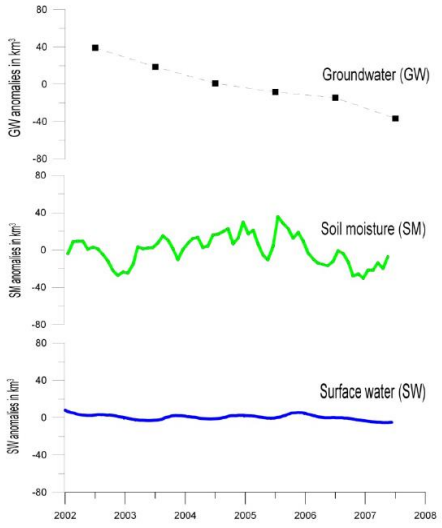
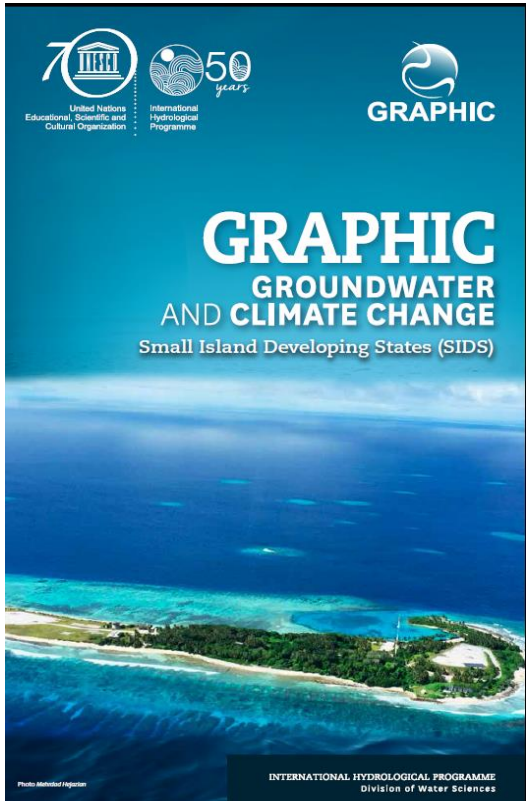


Fig.: example of slow but persistent decline in groundwater storage during a multi-year drought in the Murray-Darling Bassin, Australia.

Surface water reached lowest levels in 2 years while groundwater was still declining 6 years after the onset of the drought.

The effects of climate change on groundwater resources are therefore closely linked to **Sustainable Development Goals** and to global change drivers, including population growth, land use changes, and urbanization.



- ❖ The current ability to generate climate change scenarios for SIDS is limited using general circulation models (GCMs). GCMs do not presently simulate sufficiently fine spatial resolution to generate scenarios for many SIDS without using statistical Downscaling techniques29.
- ❖ Many GCMs also have considerable uncertainty for projected precipitation in the tropics because they do not simulate tropical convection well and do not presently reproduce some of the major modes of interannual to multidecadal climate variability, including ENSO29.
- ❖ Improved downscaling techniques, regional climate models, and finer resolution GCMs that are coupled with groundwater flow models will improve groundwater management and sustainability estimates on SIDS.

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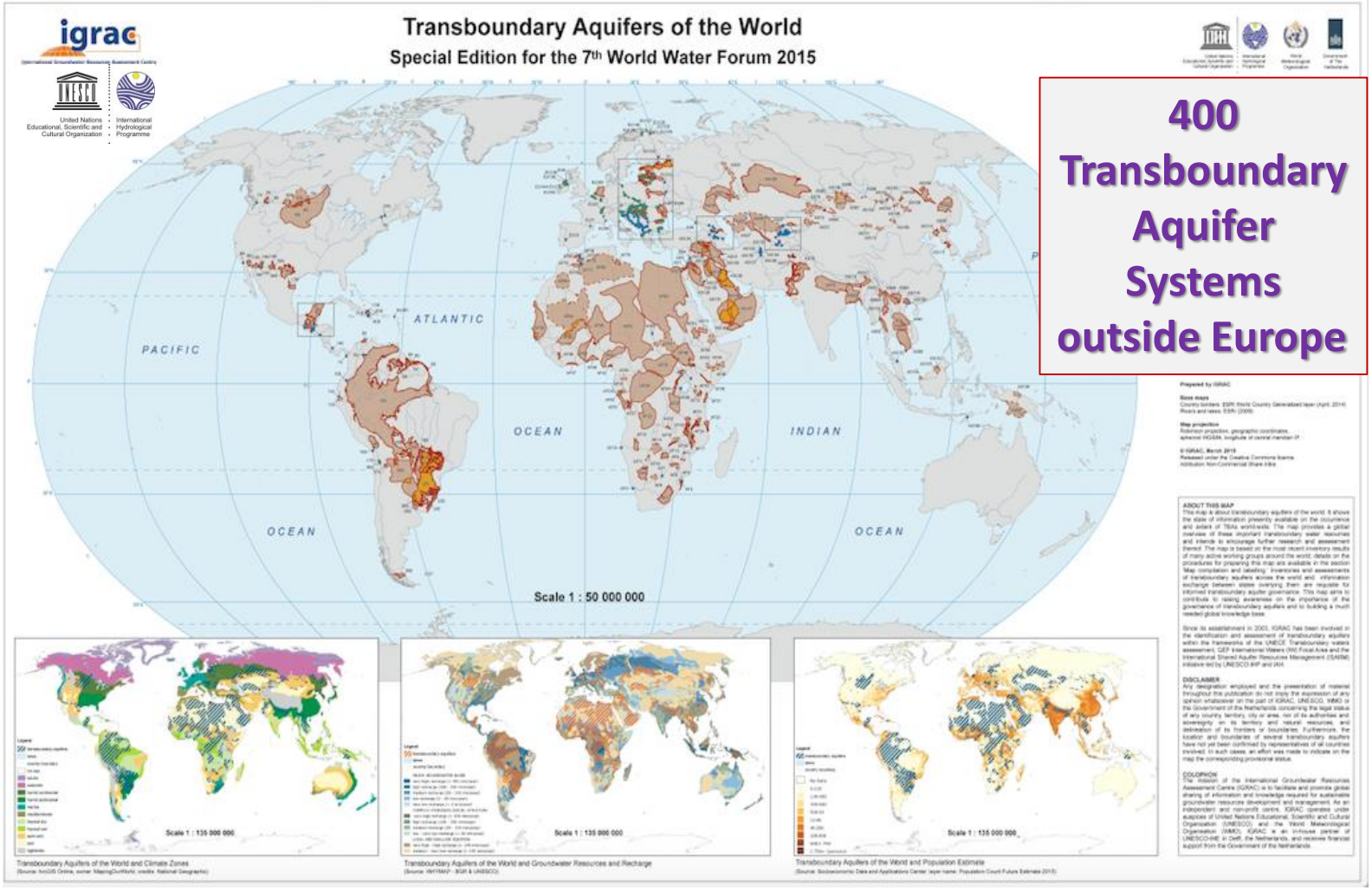

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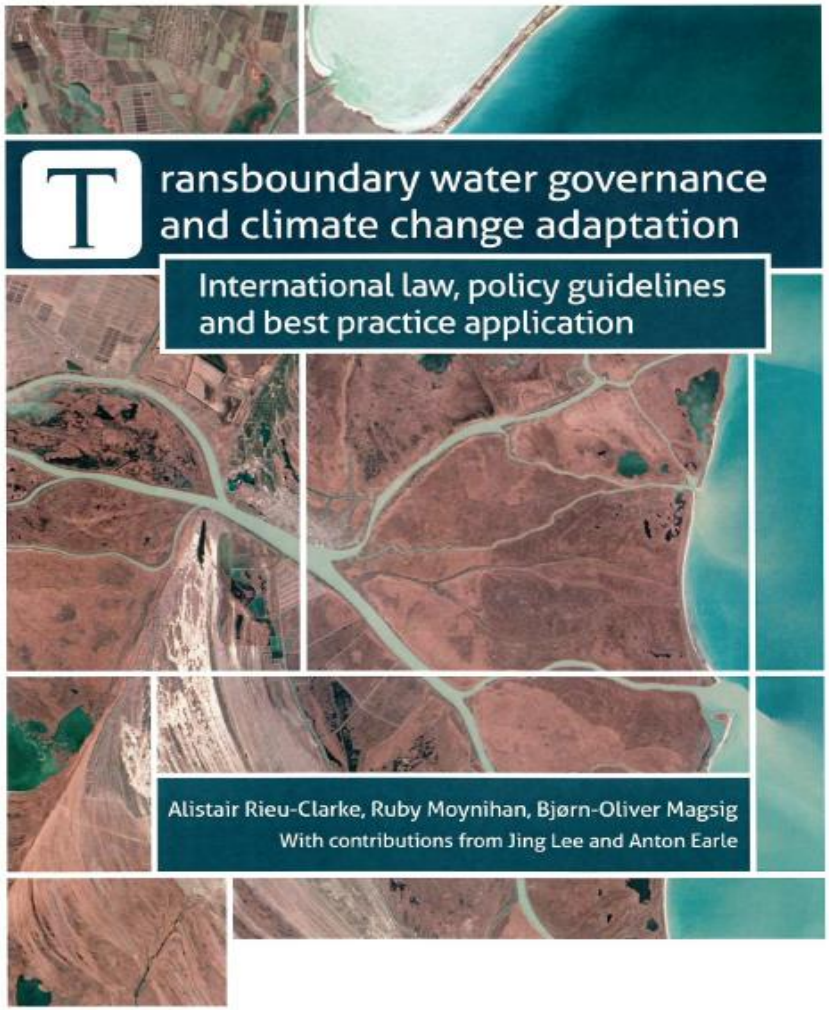

Transboundary water governance and climate change adaptation

International law, policy guidelines and best practice application

Alistair Rieu-Clarke, Ruby Moynihan, Bjørn-Oliver Magsig
With contributions from Jing Lee and Anton Earle

United Nations World Water Assessment Programme

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Technical Paper