Science to Policy: From Earth Observation to legislation

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WEBINAR INFORMATION

▪ ‘Chat’ box: please use this for general requests and for interactive activities.

▪ ‘Q&A’ box: please use this to send questions to the panelists.

Please Note: Attendees’ microphones are muted. We cannot respond to ‘Raise Hand’.
AGENDA

- Welcome, introduction, housekeeping rules and Polls
  
  *Eunice Ubomba-Jaswa (moderator)*

- Exploring the challenges and hurdles at the science policy interface (TBC)
  
  *Alexandra Bell*

- Integrating earth observation into South Africa’s national eutrophication monitoring program: success and challenges
  
  *Mark Matthews*

- Earth Observation as a tool for determining SDG indicators and NDCs – Water domain
  
  *Torsten Bondo*

- Q&A Discussion

- Final remarks and conclusion
MODERATOR & SPEAKERS

Eunice Ubomba-Jaswa
Water Research Commission
South Africa

Alexandra Bell
Julius Maximilians University of Würzburg
Germany

Mark Matthews
Cyanolakes
Australia

Eunice Ubomba-Jaswa
DHI
Denmark
POLL

Participate in the poll and share your answer with us!
WHAT IS A COMMUNITY OF PRACTICE?

- A community of practice (CoP) is a group of people who share a common concern, a set of problems, or an interest in a topic and who come together to fulfil both individual and group goals.

- CoP often focus on sharing best practices and creating new knowledge to advance a domain of professional practice. Interaction on an ongoing basis is an important part of this.

- Many CoPs rely on face-to-face meetings as well as web-based collaborative environments to communicate, connect and conduct community activities.
Community members have a shared domain of interest, competence and commitment. These create common ground, inspire members to participate, guide their learning, and give meaning to their actions.

Members pursue this interest through joint activities, discussions, problem-solving opportunities, information sharing and relationship building. The notion of a community creates the social fabric for enabling collective learning. A strong community fosters interaction and encourages a willingness to share ideas.

Community members are actual practitioners and build a shared repertoire of resources and ideas that they take back to their practice. While the domain provides the general area of interest for the community, the practice is the specific focus around which the community develops, shares and maintains its core of collective knowledge.
The IWA Earth Observation for Water Management Community of Practice (CoP) brings together experts from different sectors of the water industry interested in the use of Earth observation technologies for improved water quality and quantity management. The CoP is also linked to the PrimeWater H2020 EU project, and the GEO AquaWatch initiative.
218 persons registered
IWA EO COMMUNITY OF PRACTICE

Priority Areas

1. Understanding the different types and applications of EO data
2. Sharing information on new technologies and integration into existing systems
3. Sharing the process of uptake of EO information by different users

**In order of preference**

We held the 1st international meeting for the Community of Practice addressing the first priority topic of ‘Understanding different types of applications of EO data’. 240 participants listened to expert perspectives, as well as engaged in fruitful discussions about their experiences working with EO applications and tools.
Within the Earth Observation (EO) community, practitioners have noticed the general hesitancy of policymakers to include the application of EO services in water resources and quality management. With an abundance of sound research and reliable predictions being made, the translation of EO science into policy can and should be embraced more.

The CoP aims to provide a platform to share approaches on the application of EO technologies for water management for different end-users, enable linkages between cross-cutting scientific communities and end-users to attain a better understanding of how EO technology can be best used, and what are needs of end-users, and identify gaps and how these can be addressed in the understanding and use of EO technology in managing water.
How can a CoP address these issues?
Exploring the challenges and hurdles at the science-policy interface

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SCIENCE-POLICY INTERFACE
SCIENCE-POLICY INTERFACE
SCIENCE-POLICY INTERFACE
SPACEBORNE RS AT THE SCIENCE-POLICY INTERFACE
STATE OF THE ART: HURDLES & CHALLENGES IN PEER-REVIEWED LITERATURE

- Main contribution of studies: Problem identification / knowledge provisioning
- Challenge & future topic: policy impact assessments

DATA AVAILABILITY AND QUALITY

Consensus on definitions

Bell et al. (in prep.): Scientific evidence from space – a review of spaceborne remote sensing applications at the science-policy interface
WEB-BASED SURVEY: A STAKEHOLDERS' PERSPECTIVE

Policy

Intermediary organisations

Science
SURVEY: PARTICIPATION AND RESPONDENTS

- Survey duration: 25th November 2021 – 7th February 2022
- Response rate = 20.5% (considering $n = 487$ persons in the mailing lists)
In your opinion, to which degree do policymakers shape scientific research?

- Not at all
- Partially
- Somewhat
- Very much
- I do not know

Research topics are primarily dictated by government policymakers

>50% somewhat – primary dictate

n = 60, n_{acad./scient.} = 50, n_{intermediary} = 10

How confident are you that scientific findings shape policy decisions?

- Not at all confident
- Slightly confident
- Moderately confident
- Very confident
- Extremely confident

>50% Moderately – extremely confident
In your opinion, how relevant is your work for policymaking?

Do you think that your scientific work should contribute to policymaking?

Relevance

Convinced

NO

YES

Responses in percent [%]

$\bar{n} = 52$, $n_{\text{acad./scient.}} = 45$, $n_{\text{intermediary}} = 7$
Do you conduct policy-relevant analysis?
(E.g., providing evidence for policy-making; directly investigating policy instruments; providing evidence for policy compliance, etc.)

$n = 52$, $n_{\text{acad./scient.}} = 45$, $n_{\text{intermediary}} = 7$
RS AT THE SCIENCE-POLICY INTERFACE – NECESSARY IMPROVEMENTS

- Knowledge regarding the policy-making process
- Strengthening remote sensing training in academic curricula
- Support in developing general knowledge of the potentials of using spaceborne remote sensing data
- Availability of spaceborne remote sensing data
- Mainstreaming the integration of earth observation into the policy-making process
- Promoting networking along the science-policy interface
- Knowledge about the requirements of policy-makers regarding scientific results (e.g., accuracy, spatiotemporal and thematic scale)
- Data costs
- Capacity development (e.g., staff training)
- Data access
- Support in developing technical skills (e.g., software skills, data processing skills, etc.)

$n = 45$, $n_{acad./scient.} = 39$, $n_{intermediary} = 6$

A maximum of 5 answers per respondent could be made.

Only options with > 20% answers are shown.
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CONCLUSION

- Key results
  - **Challenge & future topic (literature review):** Policy impact assessments
  - **General opinion:** Policy and science influence each other; own work should contribute to policymaking, but only a small number of participants conduct policy-relevant analysis
  - **Improving RS at the science-policy interface:** Capacity development; knowledge development; data supply; promoting the science-policy interface

- Pivotal point: bias in survey
CONCLUSION

- Key results
  - Challenge & future topic (literature review): Policy impact assessments
  - General opinion: Policy and science influence each other; own work should contribute to policymaking, but only a small number of participants conduct policy-relevant analysis
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- Pivotal point: bias in survey

- Copernicus programme: „Nation-states have the responsibility of bringing their needs to the commission.“
- „We have to work with policymakers, otherwise we might be developing products and space missions 90 degrees sideways with respect to their needs.“
- „Federalism is a big problem and a question of competences.“
- “Scientist doesn’t have the mandate to put it into practice, why should he do it? And where are the channels into the relevant policy?”
- “It’s the added value you have to show: Here, take a look! You actually always have to go ahead as a scientist and show what is feasible. And you have to do it in such a way that the customer, the user, really understands.”
- “Hurdles? Willingness to change – to transform the urgency to act into an opportunity: The Burning Platform Theory.”
MANY THANKS FOR YOUR ATTENTION!

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Integrating earth observation into South Africa’s national eutrophication monitoring program: success and challenges

DR MARK MATTHEWS
INVESTING IN EO TECHNOLOGIES

- Is there a vision for EO?
  - Water Research Commission funds web and mobile EO technology or monitoring eutrophication and HABs nationally

- What are the technologies?
  - Accurate cyanobacteria detection
  - Health Risk Levels based on WHO guidelines
  - Trophic status based on OECD guidelines
  - Recreational Advisories (WHO)
  - Early warning (3 hours from acquisition)
  - Publicly available for lakes globally*

* Larger than 1 km squared, some shapes excluded
POLICIES FOR HARMFUL ALGAL BLOOMS

Benefits of EO
▪ **Timeliness** > 3 hour of detection
▪ **Spatial coverage** – 100%
▪ **Frequency** (6 times / week)

Current interpretation of regulations:
▪ 2 – 3 days after
▪ 1 or 2 fixed sampling points per lake
▪ Monthly or two-weekly samples

FAST, COMPREHENSIVE, UP-TO-DATE INFORMATION

SLOW, LIMITED, OUTDATED INFORMATION

10X BETTER PUBLIC HEALTH OUTCOMES

INFORMATION GAPS, MISSED EVENTS, HEALTH RISKS

ASK YOURSELF, WHAT IS IN THE PUBLIC INTEREST?
“Although it is excellent software that has a lot of practical value, I am not sure if it is fit for our purpose at the current time.”

“A monthly service subscription would be a challenge that is not currently a priority for our team”

“We are happy to keep partnering with you as the product - when it can predict with accuracy at finer detail - will be very beneficial for us.”
HOW SOME WATER COMPANIES ARE REACTING

- Not currently a priority, not fit for our purpose. If we don’t have to, we won’t…

- If it could do x, then we would use it… The impossible ask…

- Let’s do an R&D project! Operational budgets are off-limits…

- We don’t have blooms often enough… You don’t know what you don’t know…

- We can’t procure it from a single supplier… Not enough providers in the market…

- You’re creating more work for us!

LESSON: IF IT’S NOT MANDATED, IT WON’T BE USED.
POLICY GAPS

- Regulations around turn around time (3 hours of less?)
- Regulation on spatial comprehensive sampling (1 sample per hectare?)
- Regulation on sampling frequency (3 times per week?)

- EO technology will only be needed if policies are implemented that hinge on the technological benefits leveraged by EO

- EO technology can significantly improve public safety outcomes but will remain optional until such as time as policies are implemented that demand current regulations are adopted that are in the public interest
Earth Observation as a tool for determining SDG indicators and NDCs – Water domain

TORSTEN BONDO, BUSINESS DEVELOPMENT MANAGER, DHI
Earth Observation as a tool for determining SDG indicators and NDCs – Water domain

Science to Policy: From Earth Observation to legislation
18 November 2022 | IWA EO CoP

Torsten Bondo, Business Development Manager, DHI
Why Earth Observation?

As a data collection tool Earth Observation has many advantages:

• **Continuous data acquisition:**
  - Earth Observation satellites allows continuous observation of the Earth surface and its changes on a regular basis

• **Historical archive:**
  - The existing archives of Earth Observation data allows an historical view of environmental issues (40+ years)

• **Multi-scale and multi-sensor capabilities:**
  - The different Earth Observation satellite allows different types of environmental parameters and processes to be observed and monitored at global, regional, national and local scales
Towards efficient “big data” exploitation

The power of the Cloud
“Bringing the users to the data”

Big Data challenge:
The massive size of EO data generated by today’s sensors, in the order of daily Terabytes, means that cost-effective procurement of the computing infrastructure for archiving and processing is needed.

Efficient remote access for users

Data collection in the field

Satellite data
Ancillary data (terrain, soil,...)

Processing power

knowledge & algorithms
tools

User knowledge & algorithms
User data

User generated results
Earth Observation serving the Global Agendas

**Climate Action**
Paris Agreement
Monitoring Climate Change & Understanding

**Sustainable Development**
2030 Agenda
Managing progress on sustainable development in all its facets

**Disaster Risk Reduction**
Sendai Framework
Supporting Disaster Resilient Societies

Water is at the core of the 3 main global agendas
Freshwater

• Inland freshwater resources are affected by climate change as well as increasing demands for food production, energy, and water
• There is a need to monitor freshwater resources at national, regional, and global levels to understand their vulnerability to change and ensure sustainable management
• The last decades have seen a steady decline in in-situ hydrological monitoring, and satellite Earth Observation is now being recognized as an essential tool for large-scale monitoring of water resources
Freshwater ecosystems are being degraded and lost

- **Target 6.6** is: “By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.”

- **Indicator 6.6.1** tracks changes over time in water-related ecosystems.
Earth Observation serving the 2030 water agenda

- The SDG661 indicator is designed to measure changes in the extent (and quality) of different types of freshwater ecosystems over time.
- UNEP has the custodian responsibility for SDG 661.
- Earth Observation was used to fill a global data gap as many countries don’t have this information available.

The Freshwater Ecosystem Explorer | https://map.sdg661.app/#
SDG 6.6.1 indicator: workflow for monitoring and reporting

Based on global data products
Improved monitoring at national level

Forests offer significant mitigation potential. Reducing deforestation and forest degradation, improving forest management and adopting agroforestry, and promoting afforestation, reforestation and restoration, could contribute almost 18% of the mitigation needed to reach the Paris Agreement’s 1.5°C target.

Satellites already used as part of REDD+/MRV process -> NDCs

Even more can be done in water domain:
- Wetlands, sea grass, mangroves, peatlands.
Carbon Screening Tool – Stakeholders – NDCs vs VCM

Primary stakeholders:
- UNEP (GWW, SDG 6.6.1)
- Country Governments
- EPAs
- State / Provincial ministries
- NGOs
- IFIs
- Private foundations

Secondary stakeholders:
- Carbon removal protocol/standard Auditors
- Land Management Associations
- Agricultural Trade Associations
- Private Land owners / investors

NDC

VCM
Example – Wetland Carbon assessment

Earth Observation
- Soil moisture
- Water
- Vegetation
- Evapotranspiration

Wetland Extent and Type

Carbon storage
Look-up table

Emission Model
- CO₂
- CH₄
- N₂O?

Mike SHE Model
- Rainfall
- Temperature
- Topography

Wetland suitability

Carbon storage potential

Prediction
- Climate change
- Policy scenarios

Future wetlands
Net-carbon gain/loss
Conclusion & Outlook

- The ability to observe the dynamics of freshwater ecosystems over time is essential to protect and secure freshwater services, mitigating climate change, and conserving biodiversity.

- Regular and systematic EO data acquisitions provides an efficient tool for monitoring, statistical reporting, analysis and communication on the status of freshwater ecosystems.

- EO already used for SDG water indicator reporting.

- NDCs next barrier to break.

Scientific insight, social benefits, commercial value.
More information

Freshwater Ecosystem Explorer | www.sdg661.app

WorldWater | https://worldwater.earth

Torsten Bondo | tbon@higroup.com

Thank you
POLL

Participate in the poll and share your answer with us!
Q&A Discussion

MODERATOR: EUNICE UBOMBA-JASWA
UPCOMING WEBINARS

Accelerating Sludge Management towards Sustainability

WEBINAR  30 November 2022 | 14:00 GMT
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