AQUATAP-ES TAP Workshop 3

"Developing Approaches for Assessing and Optimising the Value of Ecosystem Services"

Virtual meeting

16th June 2020

Welcome

Water JPI Thematic Annual Programming (TAP) Action

AQUATAP_ES

3rd Workshop

Welcome

Miguel Ángel Gilarranz Redondo

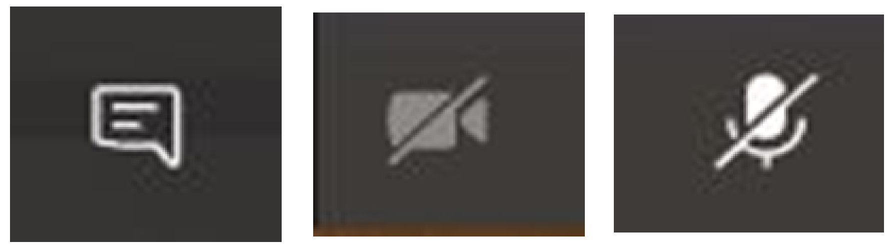
Water JPI Vice Chair

16th June 2020

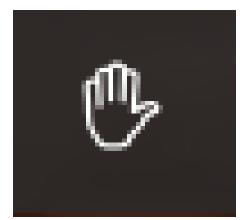
9.30am -13.00 (CEST)

Ground Rules

- Please keep your **Microphone Muted** and your **Camera Off** unless you have the floor



- **To comment, ask a question or ask for the floor**, please use the chat Function



Important

- Chat Messages are visible to **ALL**

- **Chat Messages will be Exported**

- Only Speakers should share their screen

Agenda

Part I Plenary Session: Water JPI AQUATAP_ES Midterm results

9.30am – 9.35am: Welcome: Miguel Ángel Gilarranz Redondo, Water JPI Vice Chair

9.35am – 9.45am: Aims of the workshop & Reflections on our Short Term Goal achievements - our first year: Mary Kelly-Quinn (AQUATAP_ES Coordinator)

9.45-10.00am

- Policy Brief with stakeholder input and next steps: Mary Kelly-Quinn

Part II Mid-Term Goals *Mary Kelly Quinn*

Session 1 **Compilation of data and modelling needs**

10.00 am – 11.00am:

- **Data**: What ecosystem services data do we need & what should be prioritised for collection: José María Bodoque del Pozo

11.00-11.15: Coffee Break 15 mins

11.15 – 12.15

- **Modelling**: The role of modelling in ecosystem services, & what models are available and of use? Michael Bruen

Session 2- **Guidance on developing decision-support tools**

12.15 - 12.45

- Importance of Decision-support Tools 'Setting the Scene': Christian Feld

Part III Next Steps

12.45 – 13:00 ***Lisa Sheils***

- Hand Over of Scientific Coordinator Role to Jose from Mary (Miguel)
- Recap to the audience by TAP Action members on session
- Date for next meeting (another ½ virtual meeting) for DSS in September/October.

Water JPI AQUATAP_ES Midterm results

Aims of the workshop & Reflections on our Short Term Goal achievements - our first year

Mary Kelly-Quinn (AQUATAP_ES Coordinator)

Workshop June 16th 2020

Part I Plenary Session: Aims of the Workshop & Reflections on AQUATAP-ES Short-term Goal Achievements

Mary Kelly-Quinn

AQUATAP-ES
Overall Goal - Informing Policy & Practice

AQUATAP_ES will seek to foster integration of the ecosystem service concept/ framework into decision-making relating to the management of aquatic resources. This will necessitate consideration of:

1. who the key stakeholders are and their needs,
2. information needs, e.g. policy briefs,
3. data needs and tools (e.g. numerical models, decision support tools) and training.

Strategic Approach and Expected Outputs

The Implementation Plan is divided in 3 periods:

June 2019-Jan2020 (short term)

1. Mapping of TAP expertise – June 2019
2. Submission to BiodivERsa Sutherland Scan – June 2019
3. Input to the Water JPI Consultative SRIA Workshop – October 2019
4. Mapping of TAP impact – October 2019
5. Development of a draft policy brief – January 2020

Workshop 2

February – September 2020 (mid term)

1. Compilation of data and modelling needs – June 2020
2. Guidance on developing decision-support tools/principles for decision making - November 2020

Workshop 3/4

October 2020-June 2021 (long term)

1. Stakeholder workshop – April 2021

All deliverables must be completed before the end of June 2021

What have we completed?

Planned Outputs Implementation Plan	**Other Outputs**
Mapping of TAP expertise – June 2019	Paper completed for *Springer* Encyclopedia of the UN Sustainable Development Goals. Clean Water and Sanitation: *Title: Role of the Ecosystem Services Approach & Natures Contributions to People (NCP) in supporting the achievement of SDG6 targets* – February 2020 ’
Input to Biodiversa Sutherland Horizon Scan as a group – June 2019	Accepted as Host for Session @ 3rd ESP Europe Conference, (spring 2021) *'Progress and challenges in the operationalisation of the ecosystem services approach for aquatic resources management'* – application March 2020
Mapping of TAP impact – October 2019	Feedback on the Handbook on the Use of Scenarios in Support of Decision-making (BiodivScen, BiodivERsA-Belmont Forum action) – May 2020
Input to the Water JPI Consultative SRIA Workshop – October 2019	Sought & compiled feedback on the draft policy brief - March-May 2020
Policy Brief – draft Feb. 2020	Contact made with various initiatives/projects

Workshops: June 2019 (*http://www.waterjpi.eu/implementation/thematic-activities/water-jpi-tap-action/water-jpi-first-tap-action-kick-off*) and November 2019 (*http://www.waterjpi.eu/implementation/thematic-activities/water-jpi-tap-action/2nd-aquatap-es-tap-action-on-ecosystem-services-workshop*) **Logo designed**

The role of the Ecosystem Services Approach & Natures Contributions to People (NCP) in supporting the achievement of Sustainable Development Goal 6 'Clean Water and Sanitation'

Authors

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Abbreviations

SDG, Sustainable Development Goal; UN, United Nations; ES, Ecosystem Services; NCP, Nature's Contribution to People; ESA, Ecosystems service approach; IPBES, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services; ILK, Indigenous and Local Knowledge; NBS, Nature Based Solutions; CICES, Common International Classification of Ecosystem Services

Definitions

The United Nations 'Sustainable Development Goals' (SDGs) are a collection of 17 global goals designed to be a '*blueprint to achieve a better and more sustainable future for all*' (UN 2015). The SDGs have been developed to be the world's best plan to build a better world for people and our planet by 2030.

Ecosystem Services (ES) are the contributions of nature to human wellbeing (Costanza et al. 1997, Millennium Ecosystem Assessment 2005, TEEB 2010, Haines-Young & Potschin 2014). Ecosystem services include *Provisioning Services* which are material outputs from ecosystems including food and water, *Regulation and Maintenance Services* which are the less direct benefits such as flow regulation and water purification, and *Cultural Services* include the tangible recreational uses (e.g. kayaking, fishing and walking along a river) and the less tangible benefits such as aesthetic or spiritual benefits as well as research and educational value. Supporting processes or intermediate services are the ecological functions and processes that underpin the three groups of ES and are often referred to as the final services (see Figure 1).

Nature's Contribution to People (NCP) extends the concept of ecosystem services, by classifying NCP into material, regulating and non-material services, as well as explicitly recognising the knowledge of local-indigenous communities (Díaz et al. 2018, IPBES 2019a).

Ecosystem function is the capacity of natural processes such as primary productivity or carbon cycling contributing to an ecosystem, to provide ES / NCP or Nature Based Solutions (NBS) to human populations (De Groot et al., 2002).

Nature Based Solutions (NBS) are actions which are inspired by, supported by, or copied from nature to provide environmental, social, cultural, and economic benefits (Nesshover et al. 2017).

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- **Definitions**
- **Introduction**
- **Sustainable Development Goals 6 'Clean Water and Sanitation'**
- **Ecosystem Services Approach and NCP**
- **Ecosystem services underpinning the SDG 6 targets**
- **Ecosystem degradation challenges achievement of SDG 6 goals**
- **What can evidence on the status and trends in ES / NCP tell us about progress towards achieving the SDG 6 targets?**
- **How can insights from ecosystem services and the ecosystem services approach be capitalised on to help achieve SDG 6 goals - Opportunities & Evidence?**
- **Conclusions**

Policy Brief

Short document outlining the opportunities the ecosystem services approach offers for improved protection or management of aquatic resources.

Sent to stakeholders for comment

Questions asked

- 1. *Does the Brief adequately explain the ecosystem services approach (ESA)?*
- 2. *Is the format helpful? Should it be longer?*
- 3. *Does the Brief present convincing arguments for the ESA?*
- 4. *Does it fill a policy information gap?*
- 6. *Other suggestions?*

AQUATAP-ES

Integration of the ecosystem services approach into policy & practice is key for the sustainable management of aquatic resources

Water JPI Thematic Annual Programming Action AQUATAP-ES

POLICY BRIEF No. 1

Natural capital *is the stock of natural assets (abiotic and biotic) that provides society with renewable and non-renewable resources.*

Ecosystem services *are the contributions of nature to human wellbeing.* CICES[1] defines 3 groups of services.

Provisioning Services – *the material or energy outputs from ecosystems – e.g. drinking water*

Regulating & Maintenance Services - *the various ways in which living organisms mediate or moderate the environment, e.g. removing pollutants from water.*

Cultural Services - *the direct and indirect benefits people obtain from ecosystems, e.g. recreation.*

The Problem

Humanity is dependent on nature. For example, aquatic systems provide water for domestic and industrial uses including food production, regulate the risk of flooding, capture carbon reducing the impacts of climate change, and provide spaces for outdoor recreation activities. These contributions, known as ecosystem services, support and enhance people's well-being and livelihoods.

Unfortunately, many of the Earth's ecosystems are being degraded by multiple stressors from human activities as well as climate change. Ecosystem degradation and over-exploitation have led to a dramatic decrease in biodiversity, with serious implications for ecosystem functioning and ultimately for the Earth system's ability to maintain the ecosystem services that are essential to people.

Aquatic ecosystems are particularly vulnerable. IPBES (2018)[2] highlights that the quantity and quality of freshwater in European and Central Asia have declined over the past 50 years. Pressures include withdrawals for drinking water supply and irrigation, and increasing pollution from discharges of wastewater and run-off from farmland. Pollution impacts drinking water resources, with subsequent adverse health implications, as well as important fisheries, and reduces aquatic biodiversity.

The integration of the Ecosystem Service approach into European water management is still in its very infancy. In this policy brief, we make the case for better integration.

What is the Ecosystem Services approach?

An Ecosystems Services approach is *'a way of understanding the complex relationships between nature and humans to support decision making, with the aim of reversing the declining status of ecosystems and ensuring the sustainable use / management / conservation of resources'*[3]

Ecosystem services assessments such as TEEB (2010) have demonstrated the economic benefits of '*ecosystem services*' by various methods of valuation. More recently, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has expanded the assessment framework to focus on ***'Nature's contributions to people'*** **(NCP)** which embodies both the economic value of ecosystem services and socio-cultural values of 'nature's gifts' from indigenous and local knowledge (ILK) systems.

The approach thus takes a step beyond assessing the condition of water resources by incorporating and communicating its implications for the full range of benefits that humans derive from inland and marine waters.

[1] Common International Classification of Ecosystem Services – www.cices.eu
[2] IPBES (2018). Summary for policymakers of the regional assessment report on biodiver Europe and Central Asia of the Intergovernmental Science-Policy Platform on Biodiver Fischer M, at al. editors. Bonn, Germany: IPBES Secretariat.
[3] Martin-Ortega et al. (2015). What defines ecosystem services-based approaches? In Ma Gordon, I.J. and Khan, S. (eds). *Water Ecosystem Services: A Global Perspective.* Caml Cambridge, UK.

EU Biodiversity Strategy states that *'By 2050, European Union biodiversity and ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided.*

Parties to the Convention on Biological Diversity (COP10) defined a mission *"to take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services..."*.

Nature-based Solutions *These are solution to environmental problems that are based on nature and natural features and processes.*

How can the Ecosystem Services approach support efforts to address the degradation of water resources and stem biodiversity losses?

Although the ecosystem services approach has been questioned for its human-centred focus, it may provide the best opportunity for convincing society of our dependence on nature, effecting the change necessary to support water protection efforts and ensuring sustainable delivery of essential ecosystem services. The Ecosystem Services approach:

1. Makes explicit the wide range of benefits (provisioning, regulation & maintenance & cultural) provided to humans by aquatic resources.
2. Helps convince the public of the importance and value of protecting the health of ecosystems and their biodiversity.
3. Takes account of the less apparent benefits (e.g. regulating services such as water purification) and the importance of cultural services to overall well-being.
4. Goes beyond the objective of 'good status' to better focus on benefits to humans. This is more easily appreciated by the general public than measurements of water quality or status classification.
5. Improves the basis for cost-benefit analyses to justify the expenditure on water resource protection measures.
6. Identifies synergies, disservices and trade-offs that can inform more beneficial, win-win solutions for resource management.
7. Supports the use of nature-based solutions to water-related challenges.
8. Helps address the goals of European (EU Biodiversity Strategy) and international (CBD Aichi targets and Global Biodiversity 2050) policy on biodiversity protection and several of the UN Sustainable Development Goals.

Evidence of ES/NCP in Water Policy & Legislation?

Despite the socio-economic importance of water resources, ecosystem services have not yet been integrated into Europe's major Directives that strive to maintain the health of ecosystems, such as the EU-Water Framework Directive, Marine Strategy Framework Directive, Floods Directive, NATURA 2000 and the Birds and Habitats Directive.

Research[4] shows that the ecological status of inland and coastal waters is particularly linked to regulating ecosystem services and that the maintenance of good ecological conditions is vital for the provision of ecosystem services into the future. Flow and stormwater regulation are key ecosystem services. Yet, the ecosystems services concept is barely integrated in the Floods Directive.

The EU Mapping & Assessment of Ecosystems and their Services (MAES)[5] initiative is exploring ways in which to incorporate information on natural capital and ecosystem services into resource management, with the ultimate aim of mainstreaming this across all member states. More detailed assessment is required in some countries.

What Next?

The potential of the Ecosystem Services approach is generally acknowledged but there are few guidelines on how to best integrate the approach into policy or practice. Equally, there are significant challenges, both institutional and practical. The Water JPI Thematic Annual Programming action on Ecosystem Services (AQUATAP-ES) is identifying the needs of stakeholders, and the tools necessary to facilitate operationalisation of the Ecosystem Services approach (e.g. numerical models and decision support tools and training). AQUATAP-ES will produce guidance on developing decision-support tools/principles for decision-making.

[4] Grizzetti et al. (2019). Relationship between ecological condition and ecosystem services in European rivers, lakes and coastal waters. *Science of the Total Environment* 671, 1–14.
[5] Maes J. et al. (2018). Mapping and Assessment of Ecosystems and their Services: An analytical framework for ecosystem condition. Publications office of the European Union, Luxembourg.

Water JPI Thematic Annual Programming Action AQUATAP-ES

Respondents

Name	Affiliation
Bernd Gawlik	DG Joint Research Centre
Nicolas Hette-Tronquart, Julien Gauthey, Benedicte Augeard	French Biodiversity Agency/Service mobilisation de la recherche, Institute de Recherche pour le Developpement, France
Ronan Uhel	European Environment Agency
Kati Vierikko	Finnish Environment Institute
IlKa Heikkinen	Nature Conservation Adviser in Ministry of Environment, Finland
Water management practitioner	Germany
Margaret McCarthy on behalf of Errol Close	Department of Communications, Climate Action & Environment, Ireland
Ray Spain	Local Authority Waters Programme (LAWPRO), Ireland
Bernie O'Flaherty	Local Authority Waters Programme, Ireland
James McVeigh et al.	LAWPRO Community Water Officers, Ireland
Wayne Trodd	Environmental Protection Agency, Ireland
Shane O'Boyle/Catherine Bradley/ Hugh Feeley	Environmental Protection Agency, Ireland
Donal Daly	Environmental Protection Agency, Ireland (retired)
Elvira deEyto	Marine Institute, Ireland
Cliona O'Brien	National Parks & Wildlife Service, Ireland

Key Points/Recommendations

Does the Brief adequately explain the ESA?

Generally yes, with some suggestions:

- Identify the key users & target the Brief in terms of language, content & style.

  Should we produce content tailored for difference audiences?

  What audiences do we want to concentrate on?

- State the objectives of the Brief in the introduction.

  Do the objectives vary with the user?

- Identify & state the key messages at the start of the Brief.

  What are those messages?

- Include a practical example (other than drinking water) of an ES and how it affects our lives.
- Omit jargon & specialist technical terms.

Key Points/Recommendations

Is the format helpful? Should it be longer?

The majority agreed 2 pages was the most effective length (could stretch to 3 pages if needed). Some suggestions:

- Identify & state the key messages at the start of the Brief.

  Needs to pull out those messages.

- Quite wordy, needs to be snappier.

  Can be achieved?

- Use diagrams/images to catch/focus attention/cut down on text.

  Need to identify effective diagrams.

- Definitions on side bars highlighted as useful.
- Improve visual appeal – consult with communication's expert.

  Any contacts that might help?

Key Points/Recommendations

Convincing arguments for the ESA?

Generally yes, some suggestions for improvement:

- Make the points raised to support the ESA relevant for the target audiences.
  - Needs to revisit points 1-8 on page 2.
- Avoid highly technical terminology, provide practical examples.
  - Need to identify a few key examples.
- Highlight the downside/challenges.
- Consider incentives and obstacles.

Does it fill a policy information gap?

'Communicating the benefits of the ESA to policy makers and other decision makers is a task that needs to be done'.

- Each policy has a different information gap
  - What are the key policy areas for this Brief?

What next?

Need volunteers for a subgroup to work up a revised Brief

Timeline?

End of August 2020?

Distribution – How?

Addressing the mid-term goals

February – September 2020

1. Compilation of data and modelling needs

2. Guidance on developing decision-support tools/principles for decision making

Compilation of data and modelling needs

Why are we doing this exercise?

To inform the collection of relevant ES data and in turn determine our output from the workshop

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Outline

- ✓ Objective
- ✓ Questions raised
- ✓ Feedback
- ✓ Issues to be discussed

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Objective

Identify potential data needs

How ecosystem services are being characterized?

- Mapping ecosystem services approach
- Quantitative assessment of ecosystem services

The questions that the stakeholders are asking/information they are seeking

- Policy and decision makers
- Farmers

Modelling

e.g., To assess floodplain's capacity to mitigate floods, accurate floodplain topography, channel bathymetry, land cover, flows associated with each return period are required.

Session 1: Ecosystem Services - Data
José María Bodoque del Pozo

Questions raised

- Based on your experience what questions/information might those in policy and practice (i.e. resources managers, monitoring etc.) need answers to in relation to ecosystem services? Consider whether each is relevant to policy or practice, or both.
- Identify the data types required to address the above questions (may relate to location, quantity, quality, change in the ES).
- Should we seek input from stakeholders in relation to their data/information needs?
- If yes, how might this be best achieved? Online survey?
- How do we communicate/make available the output of this exercise? Short report? Presentation at ESP conference and follow-on publication?

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Feedback: Questions raised

Practice

- ✓Where are particular ecosystem services (ES) provided by the aquatic resources in a given catchment or coastal area?
- ✓What are effects of stressors (e.g., related with climate change, hydromorphological alteration, invasive species) on the provision of ecosystem services?
- ✓What is the data availability and areal coverage (scale)?

Policy

- ✓What is the value of a particular service? e.g. , provision of clean water
- ✓How does land-use inputs change impact the flow of ES?
- ✓How can nature-based solutions be integrated into natural resource management?
- ✓What are the relative benefits of nature-based solutions compared with grey infrastructure?
- ✓How can we compare different ecosystem services in water management decisions?
- ✓What animal and plant species most contribute to improvements in water quality and what are the conditions needed to support them
- ✓How to value (next to what is) ES?
- ✓How to reconcile the full (economic, social, cultural) benefits and costs of conflicting land uses? e.g. natural floodplain habitats vs intensive agriculture?

Policy and practice

- ✓To which extent the management actions I implement influence ES?
- ✓Can I economically justify my management actions using ES?
- ✓What is stakeholders' perception of the value of ecosystem services and benefits, e.g., the restoration of river-floodplain lateral connectivity is not perceived equally by policy makers and farmers?

Session 1: Ecosystem Services - Data
José María Bodoque del Pozo

- Are we missing any questions?

Session 1: Ecosystem Services - Data
José María Bodoque del Pozo

Feedback: data types required to address the questions raised

Habitat/Ecosystem maps Practice-Policy-Practice and Policy

- ✓Where are particular ecosystem services (ES) provided by the aquatic resources in a given catchment or coastal area?
- ✓What are effects of stressors (e.g., related with climate change, hydromorphological alteration, invasive species) on the provision of ecosystem services?
- ✓What is the data availability and areal coverage (scale)?

- ✓What is the value of a particular service? e.g., provision of clean water
- ✓How does land-use inputs change impact the flow of ES?
- ✓How can we compare different ecosystem services in water management decisions?

- ✓To which extent the management actions I implement influence ES?
- ✓Can I economically justify my management actions using ES?

Land use Practice-Policy-Practice and Policy

- Where are particular ecosystem services (ES) provided by the aquatic resources in a given catchment or coastal area?
- What is the data availability and areal coverage (scale)?

- What is the value of a particular service? e.g., provision of clean water
- How does land-use inputs change impact the flow of ES?

- To which extent the management actions I implement influence ES?
- Can I economically justify my management actions using ES?

Land use inputs Practice-Policy-Practice and Policy

- ✓What is the data availability and areal coverage (scale)?

- ✓How does land-use inputs change impact the flow of ES?
- ✓How can nature-based solutions be integrated into natural resource management?
- ✓What are the relative benefits of nature-based solutions compared with grey infrastructure?

- ✓To which extent the management actions I implement influence ES?
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Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Feedback: data types required to address the questions raised

Water quality indicators

Practice-Policy-Practice and Policy

- ✓Where are particular ecosystem services (ES) provided by the aquatic resources in a given catchment or coastal area?
- ✓What are effects of stressors (e.g., related with climate change, hydromorphological alteration, invasive species) on the provision of ecosystem services?

- ✓What is the value of a particular service? e.g. provision of clean water
- ✓How does land-use inputs change impact the flow of ES?
- ✓How can nature-based solutions be integrated into natural resource management?

- ✓To which extent the management actions I implement influence ES?
- ✓Can I economically justify my management actions using ES?

Other ES condition indicators

Practice-Policy-Practice and Policy

- ✓What is the data availability and areal coverage (scale)?

- ✓What is the value of a particular service? e.g. provision of clean water
- ✓How does land-use inputs change impact the flow of ES?
- ✓How can nature-based solutions be integrated into natural resource management?
- ✓How can we compare different ecosystem services in water management decisions?
- ✓What animal and plant species most contribute to improvements in water quality and what are the conditions needed to support them
- ✓How to value (next to what is) ES

- ✓To which extent the management actions I implement influence ES?
- ✓Can I economically justify my management actions using ES?

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Feedback: data types required to address the questions raised

Hydrometerological – Water Balance components — Practice-Policy

✓Where are particular ecosystem services (ES) provided by the aquatic resources in a given catchment or coastal area?

✓How does land-use inputs change impact the flow of ES?

Value of full benefits and costs of various land uses — Policy-Practice and Policy

✓How to reconcile the full (economic, social, cultural) benefits and costs of conflicting land uses, e.g. natural floodplain habitats vs intensive agriculture?

✓What is stakeholders' perception of the value of ecosystem services and benefits, e.g., the restoration of river-floodplain lateral connectivity is not perceived equally by policy makers and farmers?

Value of ES among diverse range of stakeholders — Policy-Practice and Policy

✓How to reconcile the full (economic, social, cultural) benefits and costs of conflicting land uses, e.g. natural floodplain habitats vs intensive agriculture?

✓What is stakeholders' perception of the value of ecosystem services and benefits, e.g., the restoration of river-floodplain lateral connectivity is not perceived equally by policy makers and farmers?

Data analysis products — Policy

✓How can nature-based solutions be integrated into natural resource management?

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Water JPI Thematic Annual Programming Action AQUATAP-ES

Feedback: data types required to address the questions raised

Stakeholder categories — Practice-Policy

- ✓Where are particular ecosystem services (ES) provided by the aquatic resources in a given catchment or coastal area?
- ✓What is the value of a particular service? e.g. provision of clean water
- ✓How does land-use inputs change impact the flow of ES?
- ✓How can nature-based solutions be integrated into natural resource management?
- ✓What animal and plant species most contribute to improvements in water quality and what are the conditions needed to support them

Data on stakeholders' stated and/or revealed preferences/willingness to pay for specific ES — Policy

- ✓What is the value of a particular service? e.g. provision of clean water

Information from stakeholders' needs assessment surveys — Policy

- ✓What is the value of a particular service? e.g. provision of clean water

Water Works 2015

Session 1: Ecosystem Services - Data
José María Bodoque del Pozo

- Are we missing any data types?

- What are the data needs for the specific questions ?

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Feedback: other questions raised

Should we seek input from stakeholders in relation to their data/information needs?

Yes, It should be checked if **stakeholders** have **data available**. Also, stakeholders must first be asked what their **objectives** (at work) are and then asked what **data/information they need** to accomplish these.

We must be able to link any **data/information requirement** with a **specific purpose and to prioritise the needs** since there are always resource constraints. Without this focus stakeholders tend to ask for all possible data/information.

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Feedback: other questions raised

If yes, how might this be best achieved? Online survey?

Given the current COVID-19 situation, **online surveys**, combined with **interviews** and **workshops**, seems the best approach.

Depending on answers specified individuals might be approached to get more details so the only survey should include a question about "*Are you willing to be contacted to discuss your answers and if so to give contact details*".

Online surveys also sent out to targeted individuals, selected to represent particularly important stakeholders, to encourage their participation.

Additionally, it is proposed that the **online survey be channelled** through the **European Environment Environment Agency**, or another upper legislative body, as few might answer if the survey comes from scientists.

Session 1: Ecosystem Services - Data

José María Bodoque del Pozo

Feedback: other questions raised

Who is our target Auduience?

EEA? Water JPI? Others?

How do we communicate/make available the output of this exercise?

1. Short report?
2. Presentation at ESP conference
3. Paper Publication?
4. Any others ideas?

Session 1: Ecosystem Services - Data
José María Bodoque del Pozo

- How do we do this?
- Who is going to do this work?
- When do we finalise it?

Water 2015 Works

Water JPI Thematic Annual Programming Action AQUATAP-ES

COFFEE BREAK

11.00-11.15

Session 1: Ecosystem Services

Role of Modelling

Michael Bruen

See attached pdf

Session 2:

Guidance on developing decision-support tools

Christian Feld

AQUATAP-ES TAP Workshop 3

"The importance of decision-support tools for aquatic ecosystem management"

Christian K. Feld, University of Duisburg-Essen, GERMANY

Virtual meeting

16th June 2020

Content

1. Why decision-support tools? An example from WFD-related river basin management

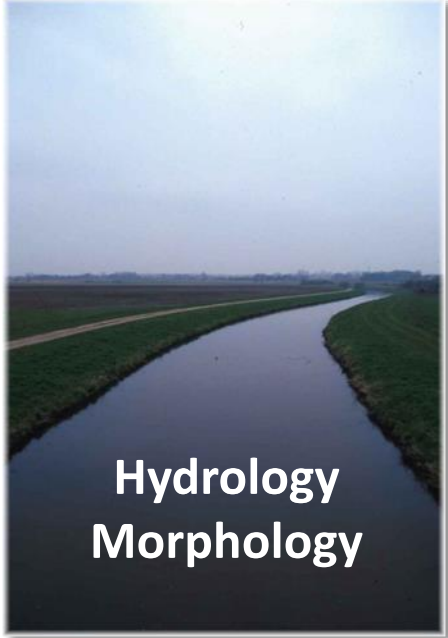
2. How a decision-support tool might look like: Examples from MARS and ESDecide

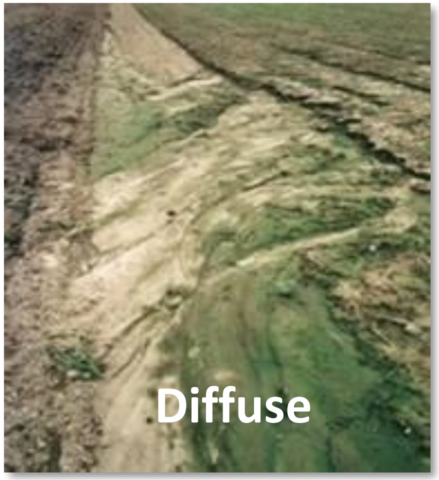
Content

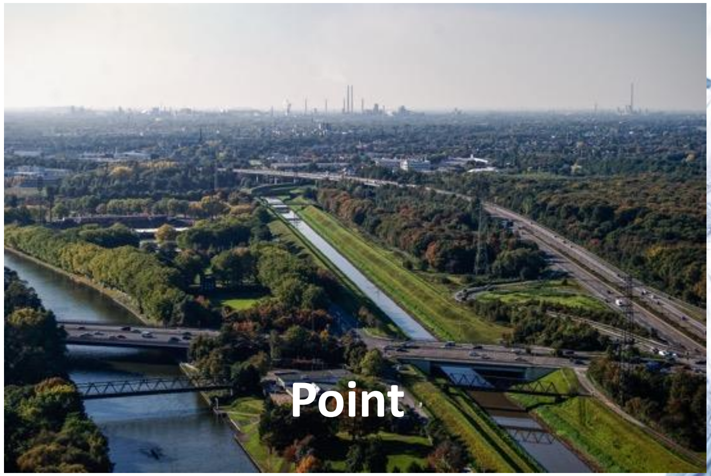
1. Why decision-support tools? An example from WFD-related river basin management

2. How a decision-support tool might look like: Examples from MARS and ESDecide

Multiple pressures = multiple causes of degradation







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ARTICLES

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Check for updates

Impacts of multiple stressors on freshwater biota across spatial scales and ecosystems

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Climate and land-use change drive a suite of stressors that shape ecosystems and interact to yield complex ecological responses (that is, additive, antagonistic and synergistic effects). We know little about the spatial scales relevant for the outcomes of such interactions and little about effect sizes. These knowledge gaps need to be filled to underpin future land management decisions or climate mitigation interventions for protecting and restoring freshwater ecosystems. This study combines data across scales from 33 mesocosm experiments with those from 14 river basins and 22 cross-basin studies in Europe, producing 174 combinations of paired-stressor effects on a biological response variable. Generalized linear models showed that only one of the two stressors had a significant effect in 39% of the analysed cases, 28% of the paired-stressor combinations resulted in additive effects and 33% resulted in interactive (antagonistic, synergistic, opposing or reversal) effects. For lakes, the frequencies of additive and interactive effects were similar for all spatial scales addressed, while for rivers these frequencies increased with scale. Nutrient enrichment was the overriding stressor for lakes, with effects generally exceeding those of secondary stressors. For rivers, the effects of nutrient enrichment were dependent on the specific stressor combination and biological response variable. These results vindicate the traditional focus of lake restoration and management on nutrient stress, while highlighting that river management requires more bespoke management solutions.

Demands on River Basin Management

Management must address all causes (pressures) of degradation

Hierarchy of management options must fit hierarchy of pressures

Management options must have targeted ecological effect: good ecological status/potential

➔ Problem: ecological status assessment and management options are often disentangled

The missing link

Monitoring → Assessment → ? → Management

- Integrated assessment (space, time)

- multiple pressures at multiple spatial scales

- lack of diagnostic metrics/tools

-lack of causality

Linking status and management in ecological diagnosis

Medical/clinical

Symptom

Diagnosis

Prescription

Ecological

Metrics

Diagnosis

Management

The role of decision-support tools: merge expertise, i. e. knowledge

To inform decisions, not to take them

1. Merge evidence of cause-and-effect relationships (driven by data and or expert's knowledge)

2. Qualify and quantify effects of causes and the potential causes given particular effects

3. Help estimate the reliability (uncertainty) of the outcome

(Link outcome with further information, e. g. on particular options to attain particular effects or options to mitigate the effect of particular causes)

In brief: Decision-support tools

Help synthesize evidence and knowledge,

Provide easy access to evidence and knowledge through intuitive user interfaces, which also

Allow for estimates of uncertainty, to ultimately

Inform decisions

Content

1. Why decision-support tools? An example from WFD-related river basin management

2. How a decision-support tool might look like: Examples from MARS and ESDecide

ESDecide

Inform management decisions, to improve river ecosystem services

Many "decisions" to take

Which services to improve? In which order (hierarchy)?

Which management options to take? In which order (hierarchy)?

Which biological effects can be expected?

What are the important environmental parameters that link management options with services?

How can those parameters be addressed, to achieve the goal?

…

Two main questions

1. What is the effect of particular river management options on ecosystem services?
   → Decision-support for prognosis

2. Which management options are required to cause a particular service at a particular rate?
   → Decision-support for diagnosis

How to obtain the answers?

1. Use data to develop prognostic models
    1. Empirical relationships between management and services
    2. Mechanistic relationships between management and services

How to obtain the answers?

1. Use data to develop prognostic models
    1. Empirical relationships between management and services
    2. Mechanistic relationships between management and services

Data is often incomplete or missing

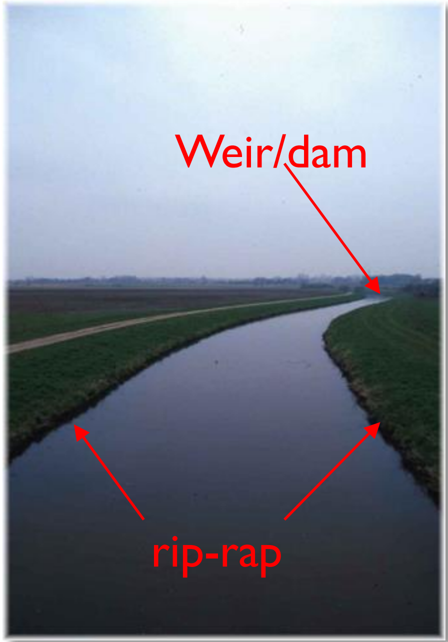
2. Use evidence to develop prognostic or diagnostic models
    1. Knowledge rules derived from data and
    2. Expert's knowledge of effects of particular causes and
    3. Expert's knowledge of the causes' probability given particular effects

Synthesize evidence as knowledge rules

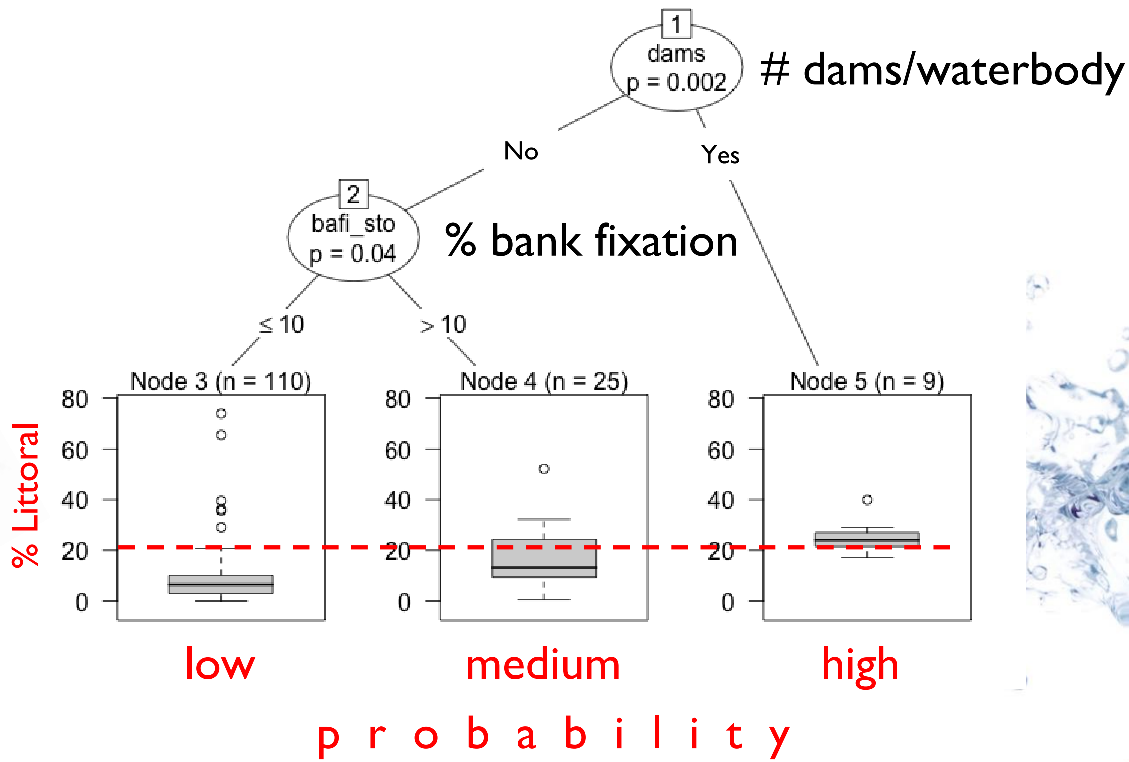
If the levels of causes a and b are high and intermediate, respectively, the effect on variable x will be high with a probability of 75%

Knowledge rules require an indication of uncertainty, to be able to estimate an effect's probability conditional on the causes → conditional probability

An example from the MARS project



Data: 144 samples from 72 sites at mid-sized, sand-bottom lowland rivers in Central Europe



Conditional probabilities

Knowledge rules

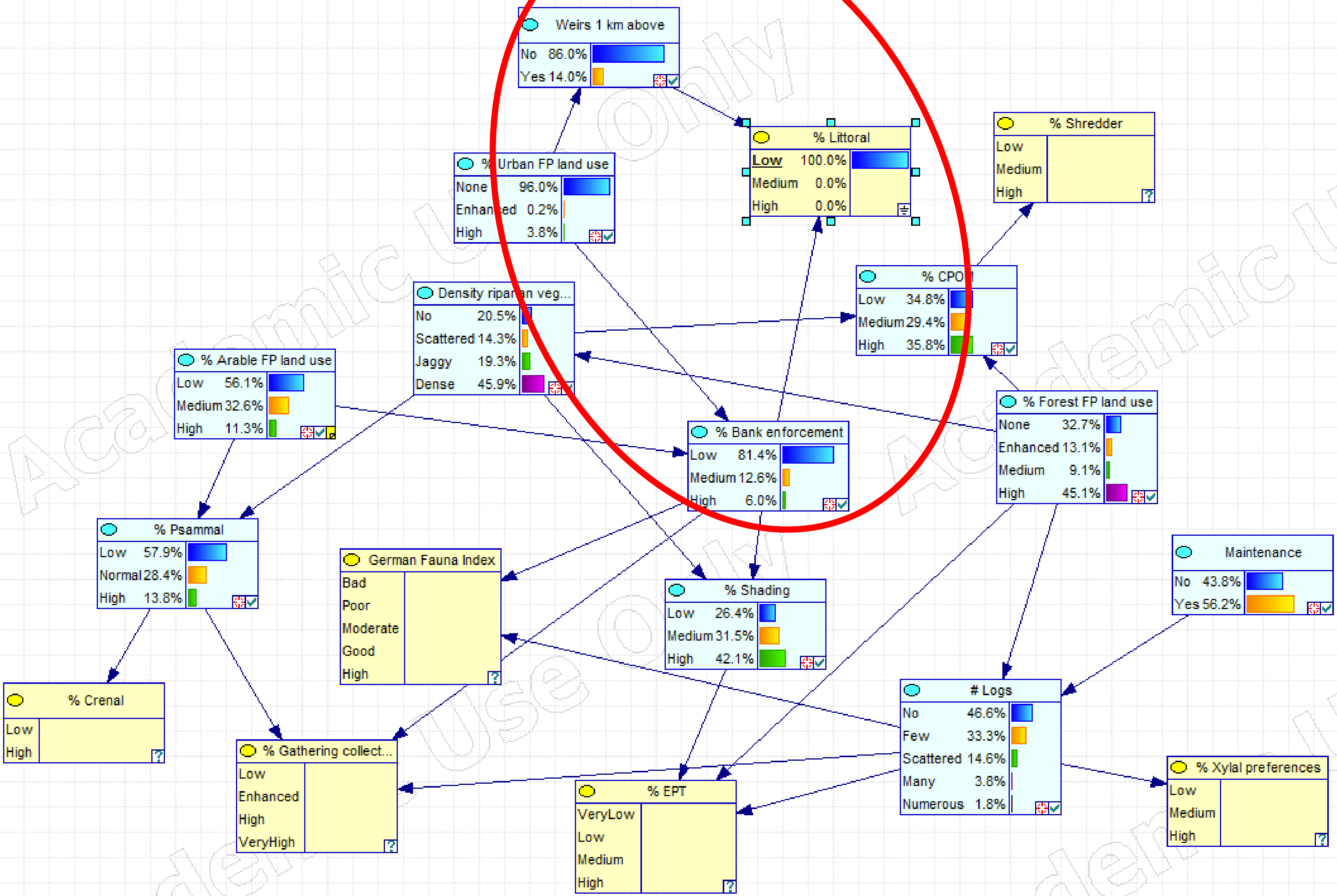
- If weir is present: >20% littoral specimens (prob.: 85%)
- If weir is absent and rip-rap >10%: <20% littoral specimens (prob.: 60%)
- If weir is absent and rip-rap <10%: <20% littoral specimens (prob.: 90%)

- **Knowledge rules can be updated, if new data, evidence and/or expertise is available**

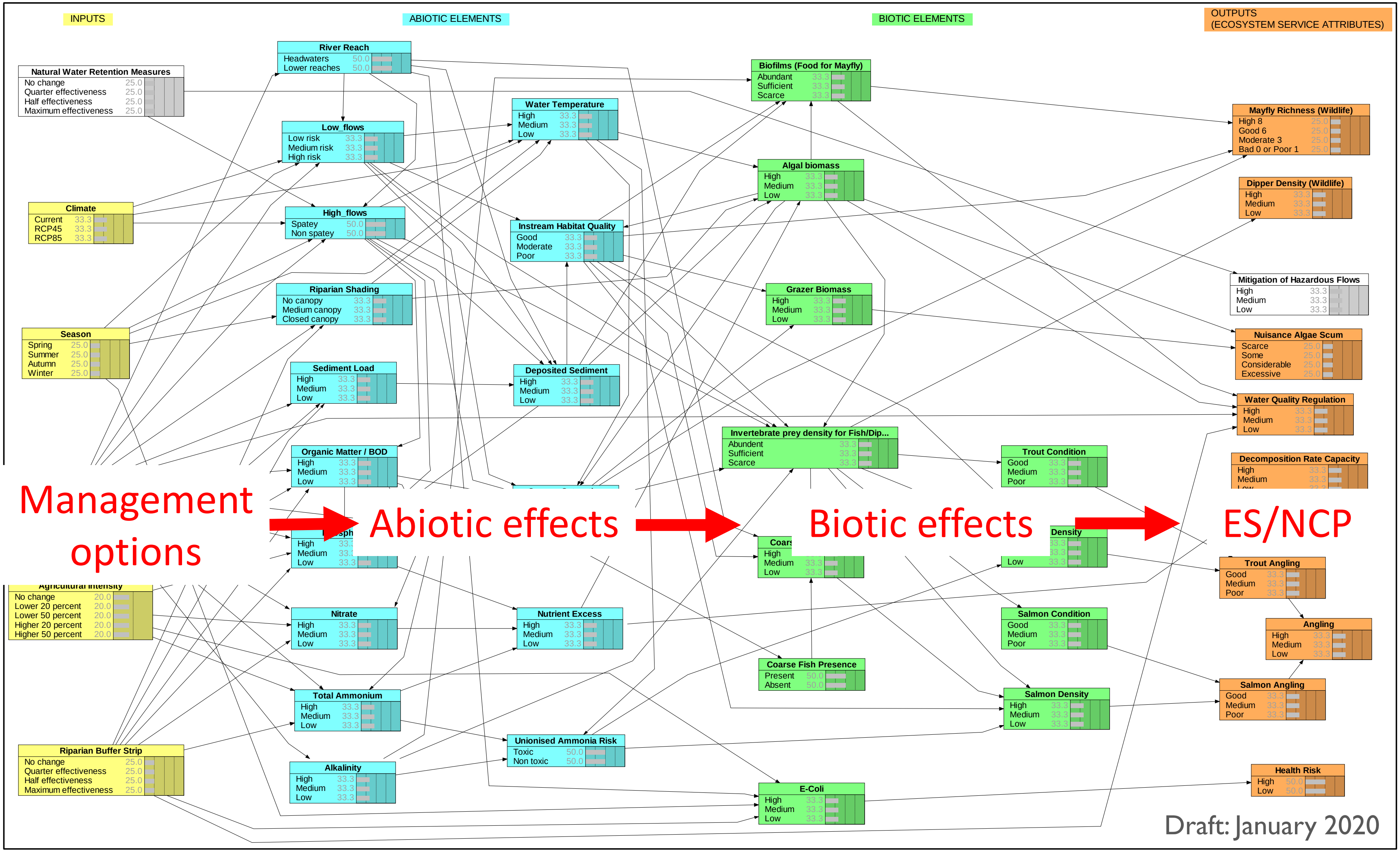
Weir 1km above	No		Yes	
% Rip-rap at re...	below_10	equal_abov...	below_10	equal_abov...
low	0.9	0.1	0.05	0.01
medium	0.07	0.3	0.1	0.04
high	0.03	0.6	0.85	0.95

Conditional probability table

Knowledge rules are combined into a Bayesian Belief Network (BBN)



The ESDecide Bayesian Belief Network (BBN)



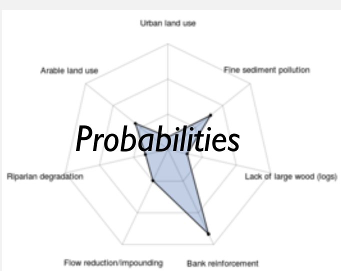
Draft: January 2020

Decision flow within the online tool

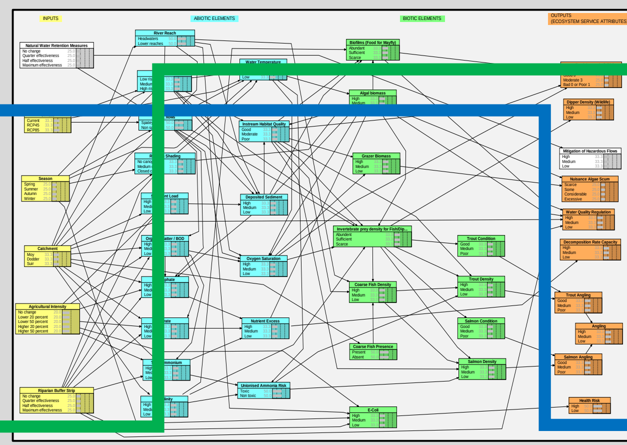
Browser-based online decision-support tool

Management options (selectable)

- Option 1
- Option 2
- Option 3
- …

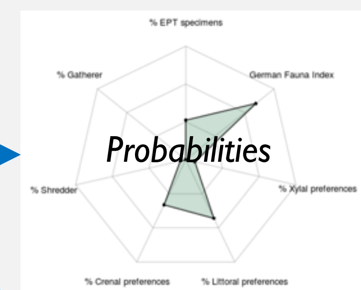


Bayesian Belief Network

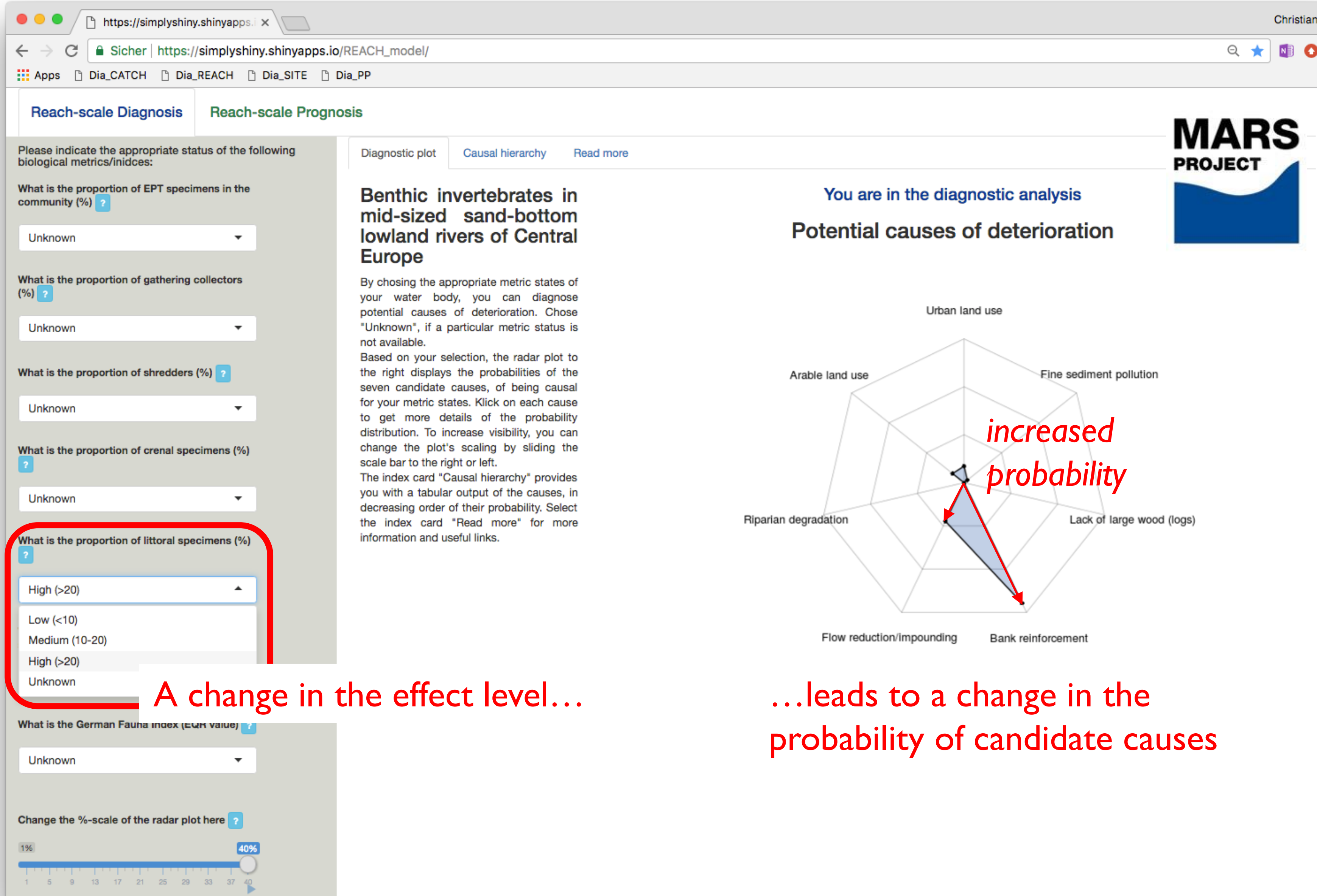


ES/NCP (selectable)

- ES/NCP 1
- ES/NCP 2
- ES/NCP 3
- …



Diagnostic example tool from the MARS project



A change in the effect level…

…leads to a change in the probability of candidate causes

Tabular output of probabilities

https://simplyshiny.shinyapps.io/REACH_model/

Reach-scale Diagnosis | Reach-scale Prognosis

Please indicate the appropriate status of the following biological metrics/inidces:

What is the proportion of EPT specimens in the community (%) — Unknown

What is the proportion of gathering collectors (%) — Unknown

What is the proportion of shredders (%) — Unknown

What is the proportion of crenal specimens (%) — Unknown

What is the proportion of littoral specimens (%) — High (>20)

What is the proportion of xylal-preferring specimens (%) — Unknown

What is the German Fauna Index (EQR value) — Unknown

Change the %-scale of the radar plot here — 1% … 40%

Diagnostic plot | Causal hierarchy | Read more

MARS PROJECT

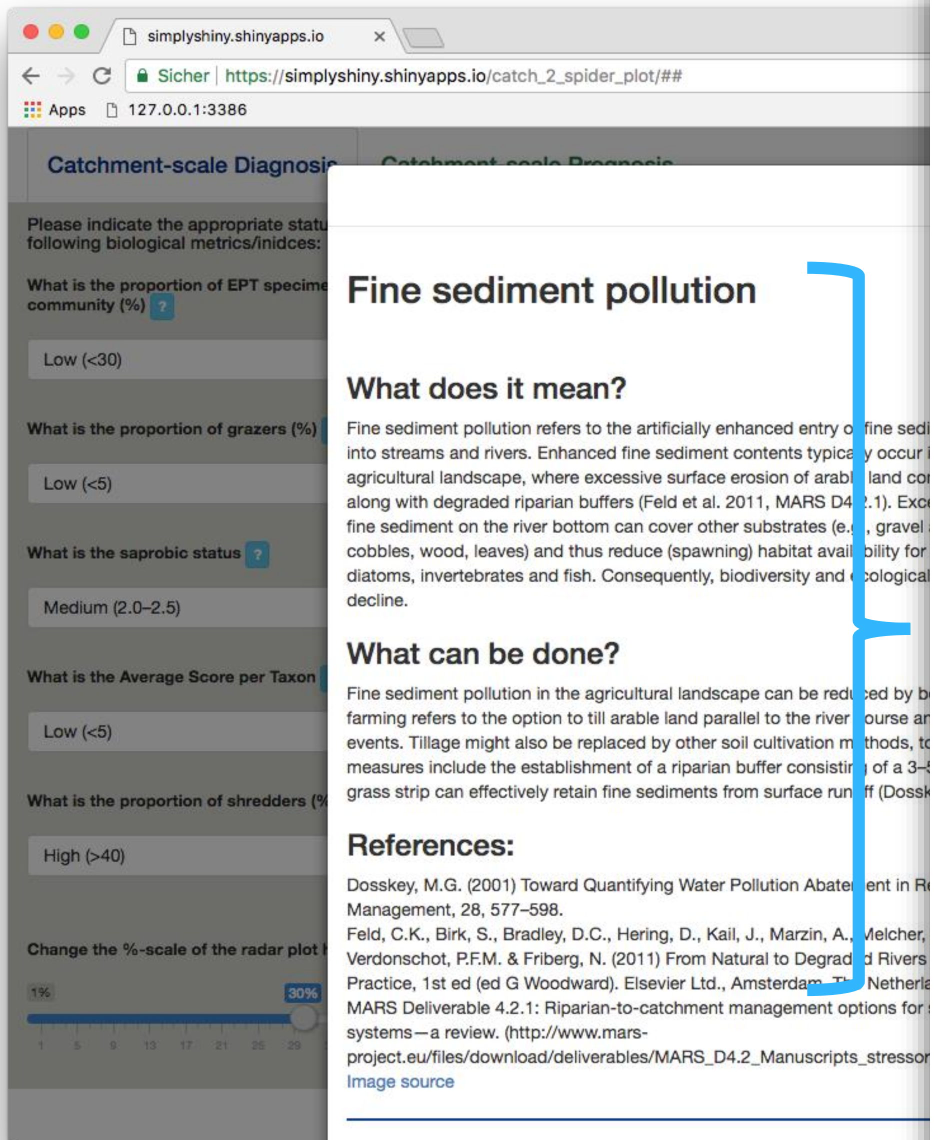
Summary:

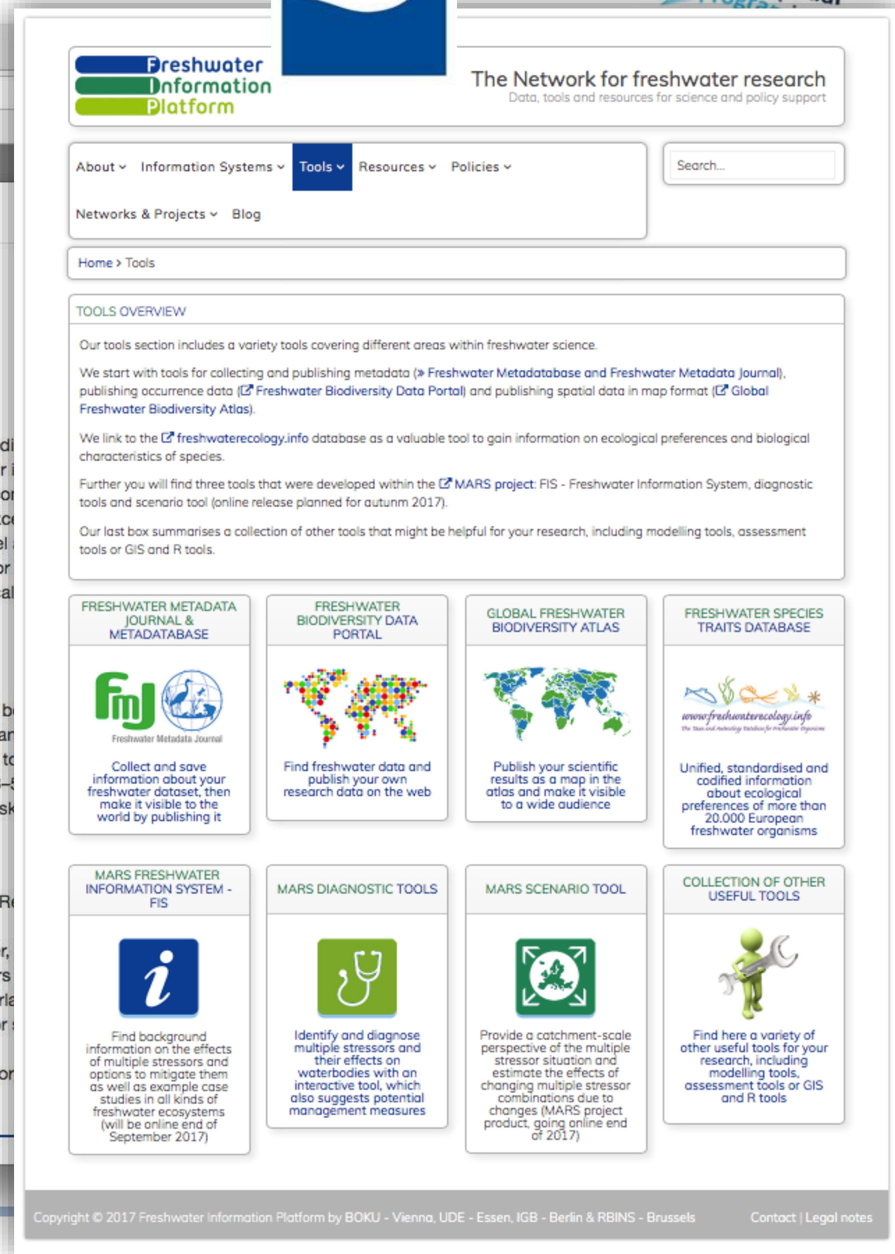
Potential causes of deterioration	Probability (%)
Bank reinforcement	37.1
Flow reduction/impounding	11.9
Urban land use	4.6
Arable land use	4.1
Fine sediment pollution	1.2
Riparian degradation	0.0
Lack of large wood (logs)	0.0

The order of potential causes at the catchment scale reflects its putative hierarchy impacting your water body. Please note that the values represent probabilities based on a complex network of causes and effects. As such, they provide guidance for further diagnosis, rather than exact values of the actual impacts operating at your water body.
Similar to medical diagnosis, you may wish to gather further "specialist's" information of the actual land use impacts, and the physico-chemical and physical habitat status of your water body. This will help further narrow down the actual causes of deterioration of your water body.
Read more about the individual causes by clicking on the names in the radar plot. The index card "Read more" provides you with useful links to gather this information.

But, please remember:
Decision-support tools can solely inform decisions.
Decisions are to be taken by informed experts.

Link to further decision-support





http://www.freshwaterplatform.eu/

Summary

Ecosystem management requires information to support ecosystem managers take the right decisions.

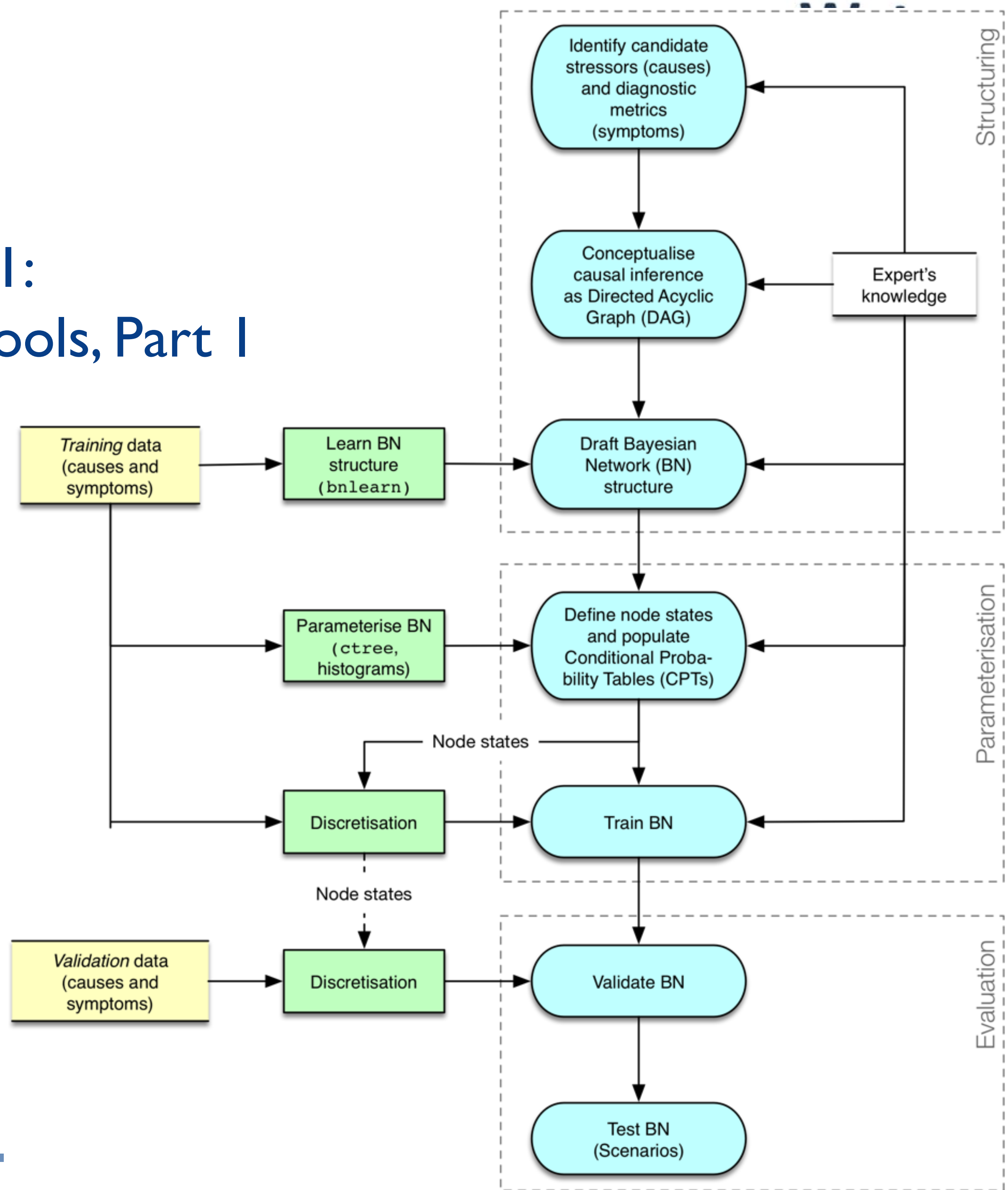
This information can be obtained from knowledge; knowledge can be generated through data, evidence and expertise (expert's knowledge).

Bayesian Belief Networks provide a modelling framework to merge the knowledge.

The "Belief" part of BBNs allows for estimates of uncertainty.

Read more

MARS Deliverable 7.1:
The MARS Suite of Tools, Part 1



Thank you!

Any questions or comments?

Part III: Next Steps
Lisa Sheils

- Hand Over of Scientific Coordinator Role to Jose from Mary
- Recap to the audience by TAP Action members on session
- Date for next meeting (another ½ virtual meeting) for DSS in October.
- AOB

Part III: Next Steps
Lisa Sheils

Phase	Task/Output	2019							2020												2021					
		June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
2 Kick-off																										
	Mapping of the TAP expertise																									
	Submission to the BiodivERsA Sutherland Horizon Scan																									
	Mapping of TAP Impact																									
	Input to the 2019 Water JPI SRIA																									
3 Implementation	Policy Brief															FINAL										
	Compilation of data and modelling needs																									
	Guidance on developing decision-support tools																									
	Stakeholder Workshop/s																									
	Face-to-face meetings	1					2							3 – ½ day				**1/ 2day DSS**	4					Final SH Worksop		
	Remote & other meetings					SRIA																				
4 Evaluate & Next Steps	Review																									

AQUATAP-ES TAP Workshop 3

Gracias, Merci,
Dank u, Kiitos, Thank You.

Virtual meeting

16th June 2020