Growing ideas through networks

KNOWLEDGE CONVERSION FOR ENHANCING MANAGEMENT OF EUROPE AN RIPARIAN ECOSYSTEMS AND SERVICES (CONVERGES)

WG1 Contribution

Thessaloniki. Greece
12/13 February 2020

Marta González del Tánago
Universidad Politécnica de Madrid, Spain

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Funded by the Horizon 2020 Framework Programme of the European Union

CONVERGES
European Riparian Ecosystems

CONTENT

1. Summary of the status of WG1 works within CONVERGES

2. Presentation of activities carried on since the last MC meeting (Prague, 2019):
   - Seminar on Riparian Vegetation Responses (Madrid, 29-30 January, 2020) (Marta)
   - Multi-scale approach for riparian vegetation characterization and assessment (Marta)
   - Phytosociological Group activities: Achieved results (Dejan)

3. Information on Deliverables: Current Status (Marta, Tenna)

4. Planning for the next years within WG1 and feeding WG2 and WG3 (Marta)

5. Open Discussion (All group)

WG1 CONTEXT

- Recognization of the Water Framework Directive (WFD) as an important driver of river hydromorphology research in EU countries
- Detection of the small relevance of Riparian Vegetation within the WFD, which emerged before clear scientific evidences of its key role in river hidromorphology
- A wide dispersion of methodologies and approaches to characterize and assess Riparian Vegetation (frequent mis-understanding between them)
- Need for new approaches to monitor and assess Riparian Vegetation within the WFD, to support understanding of responses to global changes, integrating phytosociological approaches

RIPARIAN VEGETATION RESPONSES TO GLOBAL CHANGES

WG 1 Workshop, Madrid (Spain), January 29-30, 2020

E.T.S. I. de Montes, Forestal y del Medio Natural, Universidad Politécnica de Madrid (Spain)

RIPARIAN VEGETATION RESPONSES TO GLOBAL CHANGES

WG 1 Workshop, Madrid (Spain), January 29-30, 2020

Wednesday, JANUARY 29, 2020

SESSION 1: VEGETATION RESPONSES TO GLOBAL CHANGES: A GENERAL PERSPECTIVE

9:30 – 10:15 h **Invited speaker:** Vegetation responses to global changes: Field observations and modelling perspectives (***WALTER BERTOLDI,*** *University of Trento)*
11:15 – 11:45 h Riparian trees responses to multiple stressors under global changes: how to scale up from individuals to ecosystem impacts? (***PATRICIA RODRIGUEZ GONZÁLEZ****, University of Lisboa*)
11:45 – 12:15 h Vegetation encroachment as a general response to multiple pressures (***DIEGO GARCÍA DE JALÓN****, University Politécnica de Madrid*)
12:15 – 12:45 h Fluvial processes feedback to Salicaceae. Description, thresholds and responses (***EMILIO POLITI****, University of Trento*)
12:45 – 13:15 h Modelling vegetation responses under different scenarios of climate change (***VANESA MARTINEZ FERNÁNDEZ****, Universidad Politécnica de Madrid*)

SESSION 2: VEGETATION RESPONSES TO FLOW REGIME ALTERATIONS

15:30 – 16:00 h River-forest-human interaction changes in dam reservoir backwater zone of mountain stream (***MACIEJ LIRO****, Polish Academy of Sciences*)
16:00 – 16:30 h Structure evolution of the riparian vegetation and its role in bar stabilisation on the braided-wandering river system (***ANNA KIDOVA****, Slovak Academy of Sciences*)
16:30 – 17:00 h Flood pulsing system - Assessment and Conservation (***TOMASZ OKRUSZKO****, Warsaw University of Life Sciences*)
17:00- 17:30 h General Discussion

20:45 h Social dinner

RIPARIAN VEGETATION RESPONSES TO GLOBAL CHANGES

WG 1 Workshop, Madrid (Spain), January 29-30, 2020

Thursday, January 30, 2020

SESSION 3: VEGETATION RESPONSES TO CLIMATE CHANGE AND OTHER PRESSURES

9:00 – 9:30 h Invasive riparian species and the effect of climate change on flood conveyance (***TIMEA KISS***, *University of Szeged, Hungary*)
9:30 – 10:00 h Afforestation of riparian forests on channel systems hydromorphology in the northern Negev desert (***ROEY EGOZI***, *Soil Erosion Research, Israel*)
10:30 – 11:00 h Yearly changes in herbaceous vegetation composition of Riparian ecosystem of Axios river (***ELENI ABRAHAM***, *Aristotle University Thessaloniki*)
11:00 – 11:30 h Riparian and aquatic vegetation in Mediterranean streams (***PARASKEVI MANOLAKI***, *Aarhus University, Denmark*)

SESSION 4: ASSESSING RIPARIAN VEGETATION RESPONSES TO GLOBAL CHANGES

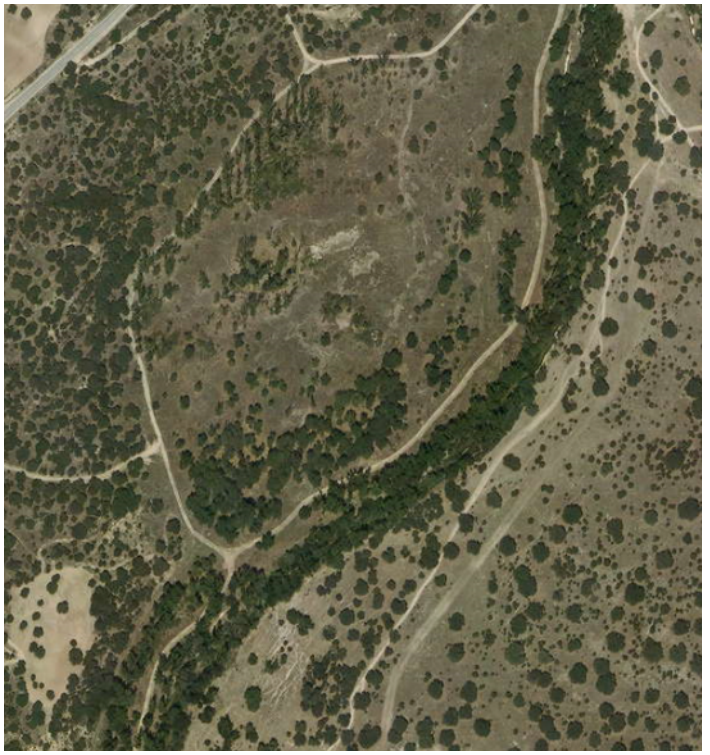
11:30 – 12:00 h Using the Norwegian Nature Classification System (NiN) for mapping of riparian vegetation and its change over time (***PEGGY ZINKE***, *Sciencemonastery AS, Norway*)
12:00 – 12:30 h Riparian vegetation responses to hydromorphological alterations in Mediterranean systems: examples from Greek National River Monitoring Network (***EVA PAPASTERGIADOU***, *University of Patras, Greece*)
12:30 – 13:00 h Riparian habitat quality evaluation in the Czech Republic - development of a new methodological approach (***JIRI JAKUBINSKY***, *Global Change Research Institute, Czech Republic*)

SESSION 5: TOWARDS NEW APPROACHES OF RIPARIAN VEGETATION ASSESSMENT AND RESTORATION

15:00 – 15:30 h Opportunities for restoring riparian vegetation at different scales based on responses to changes and existing management in Scotland (***ROBERTO MARTÍNEZ***, *Scottish Environment Protection Agency*)
15:30 – 16:15 Indicators of vegetation responses to global changes: A multi-scale approach *(**MARTA GONZÁLEZ DEL TÁNAGO**, Universidad Politécnica de Madrid)*
16:15 –17:30 h Open Discussion. Conclusions and Closing remarks

MULTI-SCALE APPROACH FOR RIPARIAN VEGETATION CHARACTERIZATION AND ASSESSMENT

SELECTING VEGETATION INDICATORS



PLANTS:
- Species
- Size, Age
- Location

VEGETATION PATCHES:
- Composition
- Diversity
- Spatial structure
- Age classes
- Functional traits

RIPARIAN CORRIDORS:
- Dominant formations
- Width, Height
- Continuity
- Patch structure
- Functional zones
- Landscape complexity

MULTI-SCALE APPROACH

(Gurnell *et al*., 2016, REFORM Proyect)

- Catchment
- Landscape unit
- River segment
- **RIVER REACH**
- Geomorphic units

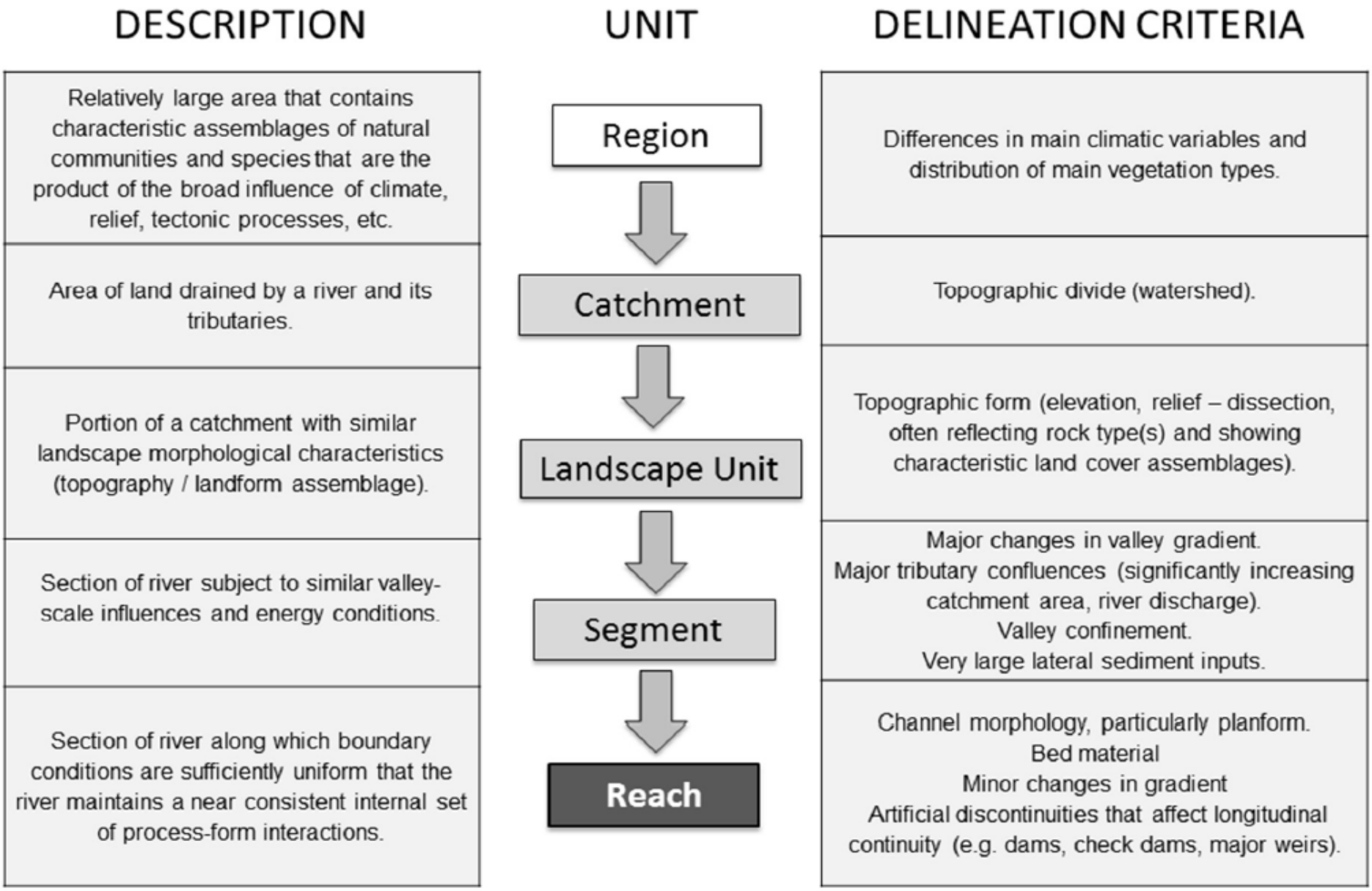
Catchment
Water divide

Landscape unit
Topography
Geology
Land cover

River segment
Between confluences

River reach
Assemblage of geomorphic units

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY



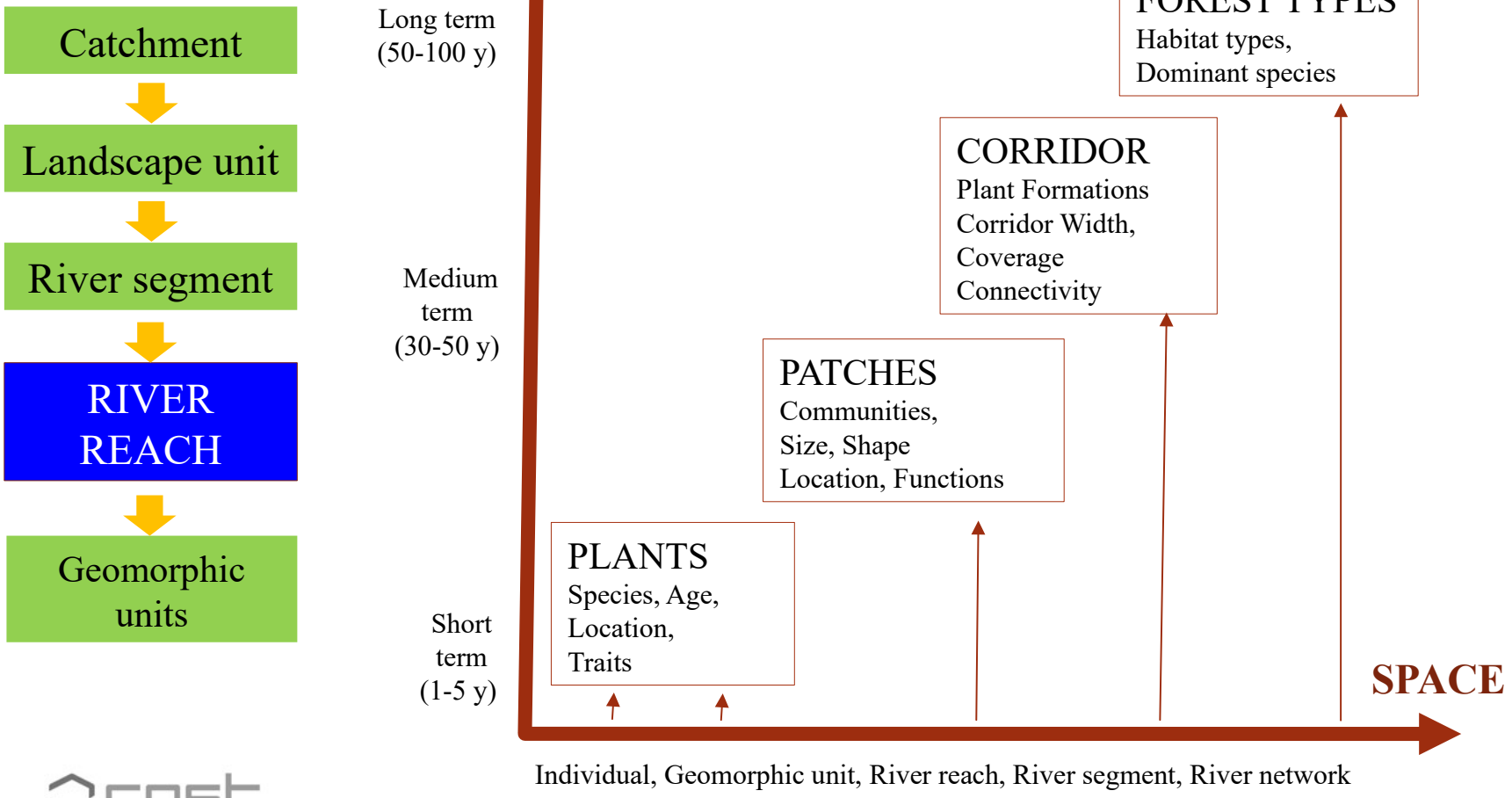
From England & Gurnell. (2016)

MULTI-SCALE VEGETATION UNITS/ INDICATORS

ANALYSIS APPROACH *(MAIN DATA SOURCE)*	**PLANT / PATCHES** RIVER REACH (0,1-1 km)	**RIPARIAN CORRIDOR** RIVER SEGMENT (1-10 km)	**CORRIDOR / FOREST TYPES** LANDSCAPE UNIT / CATCHMENT (10-100 km)
Taxonomy based *(field work)*	Species composition, Abundance, Diversity	Plant formations, Plant communities	Phytosociological classes, Habitat types, Dominant species
Landscape-mosaic approach *(GIS analysis)*	Size, shape, coverage, Relative location to channel, Spatial distribution	Riparian corridor width, coverage, Connectivity, Fragmentation,	Corridor types, Spatial assemblage of patches, Landscape diversity
Functional approach (process-based) *(field work + GIS analysis)*	Pioneer Recruitment areas, Plant functional traits, Genetic diversity	Functional zones based on dominant fluvial processes, Vegetation guilds,	Broad Longitudinal /Transversal zonation of Plant communities, Broad location of Pioneer / Late-seral species

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

MULTI-SCALE VEGETATION UNITS/ INDICATORS



PROCESS-BASED FRAMEWORK

SPATIAL SCALE	HYDROMORPHOLOGICAL PROCESS / VARIABLES	VEGETATION INDICATORS	DISTURBANCES / PRESSURES
CATCHMENT **LANDSCAPE UNIT**	Precipitation, Evapotranspiration, Topography/Landforms Land Cover, Land Uses Hillslope Runoff, Aquifer storage Erosion processes, Sediment supply	Phytosociological classes, Habitat types, Dominant species Longitudinal /Transversal zonation of Plant formations	Global (climatic) changes, Warming, Land Cover changes, Wildfires, Road construction, Irrigation, Overgrazing
RIVER SEGMENT	Valley settings interactions Flow regime, Sediment budget Channel size and planform Channel adjustments Sediment size, Alluvial depth Floodplain sediment erosion /deposition Water table fluctuation,	Plant communities, Corridor width, coverage, Connectivity, Functional zones based on dominant fluvial processes. Patch structure, Landscape complexity	Flow regulation, Water abstraction Channelization, Dredging, Gravel mining, Floodplain occupation Groundwater depletion
RIVER REACH	Flood frequency and duration, Shear stress, Riparian soil texture, Soil moisture Burial and scour processes	Species composition, Diversity Size, Location to channel, Recruitment areas, Plant functional traits, Genetic diversity	Embankments, Dredging, Channel revetments, Weirs, check-dams, Floodplain sealing, Debris filling, Plantations

PROPOSED GUIDELINES TO CHARACTERIZE AND ASSESS RIPARIAN VEGETION

A) CHARACTERIZATION AND DIAGNOSIS:

1º. Identify **spatial scales** (landscape units, river segments, reaches …)

2º. Measure and **quantify riparian vegetation indicators** at multiple scales (Characterize **current and past** conditions)

2º. Compare and **identify occurred changes** over time

3º. **Document disturbances** over time at multiple scales

5º. Establish **process-based links** between measured vegetation changes and reported disturbances

6º. Understand river **trajectories from the past** and predict river trajectories **towards the future** under manament options

PROPOSED GUIDELINES TO CHARACTERIZE AND ASSESS RIPARIAN VEGETION

A) CHARACTERIZATION AND DIAGNOSIS:

Current conditions

Past conditions

Channel changes

Riparian Corridor changes

Damming (1974)

Gravel mining (1960-2000)

Agriculture Urbanization (1970-2010)

PAST → PRESENT → FUTURE

Reconstruct trajectories related with pressures

Predict vegetation trends under future scenarios

PROPOSED GUIDELINES TO CHARACTERIZE AND ASSESS RIPARIAN VEGETION

B) ASSESSMENT:

1º. Define "**natural** (non-human induced) or target conditions" as "**reference**"

2º. **Quantify deviations from** reference conditions

3º Establish **thresholds for asigning "quality status"**

4º . Identify indicators/indices of "**functionality**" and indicators/indices of "**artificiality"** of forms and processes, to explain thresholds between quality status

PROPOSED GUIDELINES TO CHARACTERIZE AND ASSESS RIPARIAN VEGETION

?

B) ASSESSMENT:

Current conditions

Natural (Reference) conditions

Channel deviations

Riparian Corridor deviations

	Status
<<	• Very good
<	• Good
=	• Fair
>	• Poor
>>	• Very poor

Needs for Reference conditions according to Objectives, and Criteria for stating thresholds of status

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

CONCLUSIONS

CONVERGES
European Riparian Ecosystems

1. The Water Framework Directive should be **up-dated** in its hydromorphological background, assuming the interest of **including riparian vegetation** as a key hydromorphological element

2. A **multi-scale process-based** approach for riparian vegetation assessment could **integrate** existing riparian vegetation protocols, and **facilitate understanding** of riparian vegetation responses to disturbances

3. Guidelines to apply the proposed approach should include **two different stages**, one for **Characterization and Diagnosis** and another one for **Assessment** Vegetation status

4. Interest of collecting data from **case-studies across European rivers,** to **prove** the proposed multi-scale approach, and **document potential references** from the less human-altered rivers

CONTENT

1. Summary of the status of WG1 works within CONVERGES

2. Presentation of activities carried on since the last MC meeting (Prague, 2019):
   - Seminar on Riparian Vegetation Responses (Madrid, 29-30 January, 2020) (Marta)
   - Multi-scale approach for riparian vegetation characterization and assessment (Marta)
   - **Phytosociological Group activities: Achieved results (Dejan)**

3. Information on Deliverables: Current status (Marta, Tenna)

4. Planning for the next years feeding WG2 and WG3 (Marta)

5. Open Discussion (All group)

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

CONVERGES European Riparian Ecosystems

CONTENT

1. Summary of the status of WG1 works within CONVERGES

2. Presentation of activities carried on since the last MC meeting (Prague, 2019):
   - Seminar on Riparian Vegetation Responses (Madrid, 29-30 January, 2020) (Marta)
   - Multi-scale approach for riparian vegetation characterization and assessment (Marta)
   - Phytosociological Group activities: Achieved results (Dejan)

3. **Information on Deliverables: Current status (Marta, Tenna)**

4. Planning for the next years feeding WG2 and WG3 (Marta)

5. Open Discussion (All group)

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

CONVERGES European Riparian Ecosystems

WG 1 PROGRAMMED WORK AND DOCUMENTS

TASKS

T1.1 1-11 Define a protocol to assess RV status and pressures
T1.2 12-30 Assess RV status
T1.3 12-30 Assess RV pressures
T1.4 12-30 Assess RV impacts

MILESTONES

M1.1 4-8 STSMs to define the assessment protocol (n = 3)
M1.2 15-17 Assessment for each country/region
M1.3 20 Workshop for cross comparison of status and pressures (including a field trip
M1.4 24 Process-based diagram about pressure/status relationships
M1.5 24 Training School for ECIs and end users about RV and related ecosystem serv
M1.6 30 Workshop for final results presentation
M1.7 34 Submission of review paper(s)

DELIVERABLES

D1.1 10 Guidance to implement the protocol for the status/pressures assessment
D1.2 14 Report about ecosystem services provided RV
D1.3 24 Graphic description of relationships between pressures and status
D1.4 32 Report about riparian status, pressures and changes in EU
D1.5 36 Review paper

✓ Finished ❖ On-going ▪ Partially finished

TASKS

- ✓ T1.1 1-11 Define a protocol to assess RV status and pressures
- ❖ T1.2 12-30 Assess RV status
- ❖ T1.3 12-30 Assess RV pressures
- ❖ T1.4 12-30 Assess RV impacts

MILESTONES

- ✓ M1.1 4-8 STSMs to define the assessment protocol (n = 3)
- ✓ M1.2 15-17 Assessment for each country/region
- ▪ M1.3 20 Workshop for cross comparison of status and pressures (including a field t
- ▪ M1.4 24 Process-based diagram about pressure/status relationships

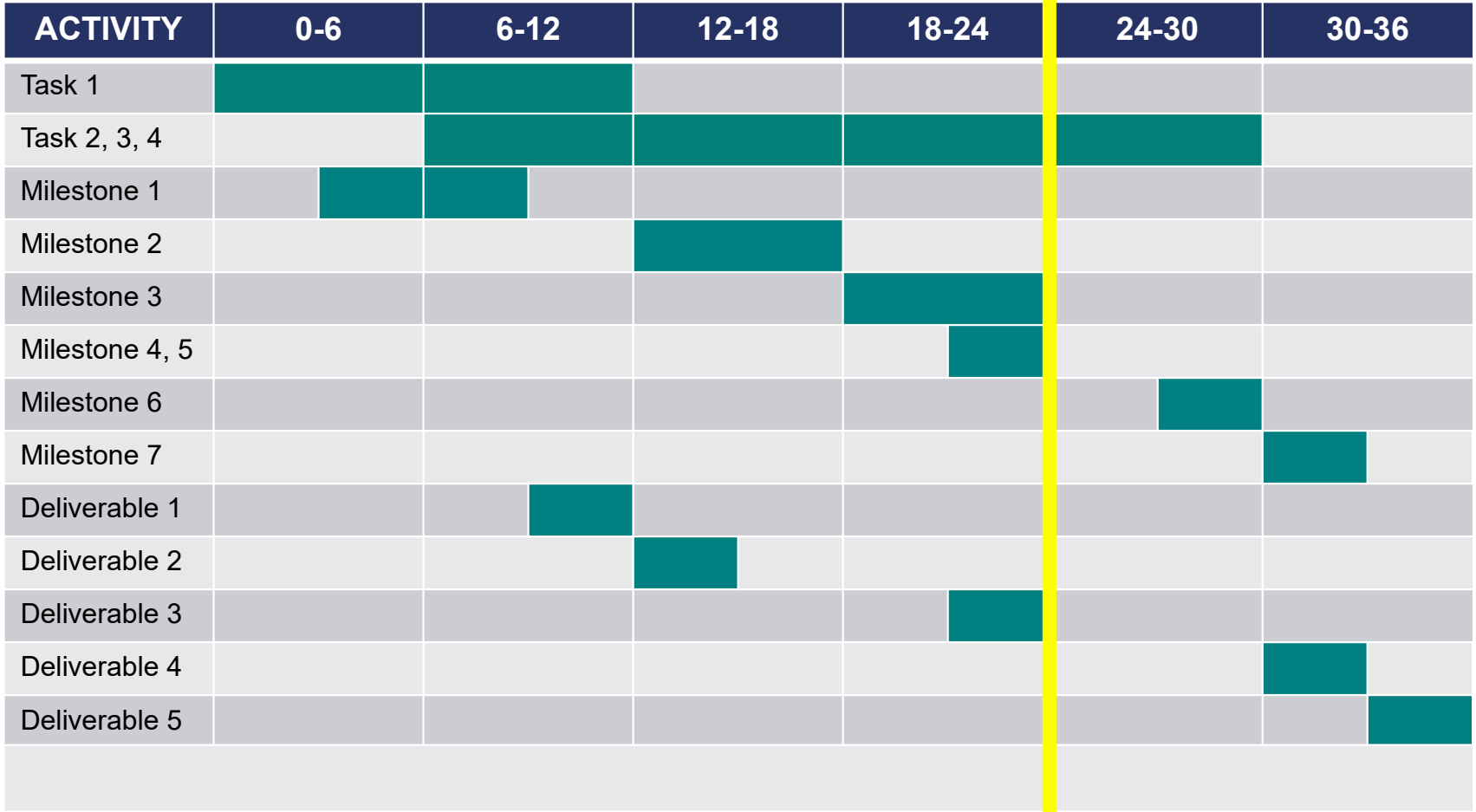
M1.5 24 Training School for ECIs and end users about RV and related ecosystem serv
M1.6 30 Workshop for final results presentation
M1.7 34 Submission of review paper(s)

DELIVERABLES

- ✓ D1.1 10 Guidance to implement the protocol for the status/pressures assessment
- ✓ D1.2 14 Report about ecosystem services provided RV
- ▪ D1.3 24 Graphic description of relationships between pressures and status

D1.4 32 Report about riparian status, pressures and changes in EU
D1.5 36 Review paper

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY



DELIVERABLES

- ✓ D1.1 10 Guidance to implement the protocol for the status/pressures assessment
- ✓ D1.2 14 Report about ecosystem services provided RV
- ❖ D1.3 24 Graphic description of relationships between pressures and status

D1.4 32 Report about riparian status, pressures and changes in EU

D1.5 36 Review paper

CONTENT

1. Summary of the status of WG1 works within CONVERGES

2. Presentation of activities carried on since the last MC meeting (Prague, 2019):
   - Seminar on Riparian Vegetation Responses (Madrid, 29-30 January, 2020) (Marta)
   - Multi-scale approach for riparian vegetation characterization and assessment (Marta)
   - Phytosociological Group activities: Achieved results (Dejan)

3. Information on Deliverables: Current status (Marta, Tenna)

4. **Planning for the next years within WG1 and feeding WG2 and WG3 (Marta)**

5. Open Discussion (All group)

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

CONVERGES European Riparian Ecosystems

LOOKING FORWARDS within WG1 and to WG2, WG3

What we have:

- Proposal of **Multi-scale process-based approach** for riparian vegetation characterization and diagnosis
- **Functional links** between riparian vegetation status and disturbances
- **Lack of data to define "natural** (non-human induced) or reference conditions of riparian vegetation, according to river hydromorphological typologies and biogeographic regions

What we propose for the next year:

- Validate the proposal, integrating methodologies and **documenting case studies** across European rivers
- Interdisciplinary groups (expertise on fluvial morphology and botany) to **draft "natural" conditions** of riparian corridors according to river typologies
- Assess and Report about riparian status, pressures and changes in EU

CONTENT

1. Summary of the status of WG1 works within CONVERGES

2. Presentation of activities carried on since the last MC meeting (Prague, 2019):
   - Seminar on Riparian Vegetation Responses (Madrid, 29-30 January, 2020) (Marta)
   - Multi-scale approach for riparian vegetation characterization and assessment (Marta)
   - Phytosociological Group activities: Achieved results (Dejan)

3. Information on Deliverables: Current status (Marta, Tenna)

4. Planning for the next years within WG1 and feeding WG2 and WG3 (Marta)

5. **Open Discussion (All group)**

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

CONVERGES European Riparian Ecosystems


THANK YOU FOR YOUR
ATTENTION ¡