

Supplementary materials

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Documentation of the list of literature sources analysed for the construction of the analytical framework.

Table S1. List of literature sources analysed.

1. Coral, C. and Bokelmann, W. The Role of Analytical Frameworks for Systemic Research Design, Explained in the Analysis of Drivers and Dynamics of Historic Land-Use Changes. *Systems*. 2017, 5 (20).
2. Djalante, R. Adaptive governance and resilience: the role of multi-stakeholder platforms in disaster risk reduction. *Nat. Hazards Earth Syst. Sci.* 2012, 12: 2923–2942.
3. EEA Report No 3/2013 Adaptation in Europe Addressing risks and opportunities from climate change in the context of socio-economic developments. Publications Office of the European Union, 2013. Copenhagen, 2013. ISSN 1725-9177.
<http://www.eea.europa.eu/publications/adaptation-in-europe>
4. EEA Report No 1/2017. Climate change, impacts and vulnerability in Europe 2016. An indicator-based report, Luxembourg, 419 p. doi: 10.2800/534806. Available online: <https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016>.
5. European Climate Change Adaptation Platform. Uncertainty guidance topic 2. <http://climate-adapt.eea.europa.eu/knowledge/tools/uncertainty-guidance/topic2>.
6. European Commission. Guidance document N° 24. River Basin Management in a Changing Climate. Common Implementation Strategy for the Water Framework Directive (2000/60/E). 2009. Available online: http://www.mapama.gob.es/es/agua/publicaciones/guia_24_tcm7-28991.pdf.
7. European Commission. Report on the progress in implementation of the Water Framework Directive Programmes of Measures. 2015. Available online: https://circabc.europa.eu/sd/a/a88369ef-df4d-43b1-8c8c-306ac7c2d6e1/Guidance%20document%20n%20n%2024%20-%20River%20Basin%20Management%20in%20a%20Changing%20Climate_FINAL.pdf.

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11. Folke, C.; Hahn, T.; Olsson, P.; Norberg, J. Adaptive governance of social-ecological systems. *Annu. Rev. Environ. Resour.* 2005, 30: 441-473.
12. Huitema, D.; Mostert, E.; Egas, W.; Moellenkamp, S.; Pahl-Wostl, C.; Yalcin, R. Adaptive water governance: assessing the institutional prescriptions of adaptive (co-)management from a governance perspective and defining a research agenda. *Ecology and Society.* 2009, 14(1): 26. <http://www.ecologyandsociety.org/vol14/iss1/art26/>.
13. Huntjens, P.; Lebel, L.; Pahl-Wostl, C.; Camkin, J.; Schulze, R.; Kranz, N. Institutional design propositions for the governance of adaptation to climate change in the water sector. *Glob. Environ. Chang.* 2012, 22: 67–81.
14. IPCC, 2014a: Summary for policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.
15. IPCC, 2014b: *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.
16. Ireland- 2008. *Adapting the Plans Adapting the Plans to Climate Change. Final Report.* <http://www.wfdireland.ie/docs/Adapting%20the%20Plan%20to%20Climate%20Change.pdf>.
17. Kirchhoff, C.J.; Lemos, M.C.; Engle, N.L. What influences climate information use in water management? The role of boundary organizations and governance regimes in Brazil and the U.S. *Environ. Sci. Policy*, 2013, 26: 6-18.
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24. NeWater - New Approaches to Adaptive Water Management under Uncertainty (Contract no. 511179 (GOCE)).

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<http://www.ecologyandsociety.org/vol9/iss4/art2/>.
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29. Pahl-Wostl, C. and Kranz, N., Editors. Water governance in times of change. *Environ. Sci. Policy* 2010, 13(7): 567-660.
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Documentation of the complete Analytical Framework to assess the incorporation of climate change adaptation in water management.

Table S2. Complete Analytical Framework containing all areas of analysis and all key evaluation questions. For answers use ‘+’ if the question is properly considered in the plan, ‘±’ if it is partially covered and ‘-’ if the question is not considered in the plan.

Analytical framework and key evaluation questions		
1. Basic information		
1.1 Title		
1.2 Promoter		
1.3 Authors and type of entity they belong to		
1.4 Year of publication		
1.5 Temporal horizon		
1.6 Geographical scale		
1.7 General objective		
1.8 Annexed or complementary documents to the plan included in the analysis.		
2. Incidence area characterisation		
Key evaluation questions	+ / ± / -	Comments
2.1 Is a diagnosis made of the current status of the plan’s incidence area?		
2.2 Does the diagnosis include a pressure and impact analysis?		
2.3 Does the diagnosis integrate biophysical studies ?		
2.4 Does the diagnosis integrate socio-economic studies ?		
2.5 Does the diagnosis describe the political context ?		
2.6 Does the diagnosis describe the legal context ?		
2.7 Does the plan describe the methodologies used to carry out the diagnosis?		

2.8 Are uncertainties related to the ecosystems and their functioning considered?		
2.9 Are the information sources clearly indicated and are they accessible?		
2.10 Does the diagnosis use information contained in other studies (scientific)?		
3. Incorporation of Climate change		
Key evaluation questions	+ / ± / -	Comments
3.1 Does the plan include climate change projections ?		
3.2 Is the time horizon of the projections used indicated?		
3.3 Do climate projections come from recognised organisms , as for example the IPCC?		
3.4 Is the scale of the climate projections adequate for the scale of study? (Climate downscaling).		
3.5 Does the plan evaluate the vulnerability of the ecosystems found in its incidence area?		
3.6 Does the plan evaluate the social vulnerability of its incidence area?		
3.7 Does the plan explain how ecosystems and social vulnerabilities have been evaluated?		
3.8 Does the plan include a climate change impacts on the ecosystems present?		
3.9 Does the plan include a climate change impacts on the socio-economic sectors present?		
3.10 Does the plan indicate the methodologies used to evaluate climate change impacts?		
3.11 Does the plan indicate which type of impact and vulnerability information has been used? a. Is it quantitative information coming from modelling? b. Is it qualitative information? c. Is it semi-quantitative information? d. Is it information based on expert judgement?		
3.12 Are scientific uncertainties related to climate change projections and impacts on ecosystems considered?		

3.13 Does the plan clearly indicate its sources of information and are they accessible ?		
3.14 Does the climate change section of the plan use information contained in other studies (scientific)?		
4. Structure and general content		
Key evaluation questions	+ / ± / -	Comments
4.1 Does the plan contain specific objectives ?		
4.2 Does the plan contain the challenges it aims at tackling?		
4.3 Does the plan include a clear abstract ?		
4.4 Does the plan include a glossary of concepts and terminology used?		
4.5 Does the plan indicate its target audiences ?		
4.6 Is information included about the limitations of the plan?		
4.7 Does the plan mention the complexity associated with the issues included in it?		
4.8 Does the plan address in one way or another this complexity ?		
4.9 Is there a plan of measures ?		
4.10 Does the plan include an implementation strategy ?		
4.11 Does the plan include a specific section on the measures' follow up ?		
4.12 Does the follow-up section consider indicators ?		
4.13 Does the follow-up section consider an associated budget ?		
5. Management measures		
Key evaluation questions	+ / ± / -	Comments
5.1 Does the plan contain an in depth description of the measures?		
5.2 Does the plan relate specific challenges to the measures that intend to tackle them?		
5.3 Does the plan analyse the adaptive character of the measures included?		
5.4 Are management measures categorised using adaptive criteria ? Flexibility, robustness, no-regret, win-win...		
5.5 Does the plan consider characteristics for the measures such as:		

a. feasibility b. acceptability c. preconditions		
5.6 Does the plan include an economic valuation of the measures?		
5.7 Does the plan include an impact assessment for the measures?		
5.8 Does the plan consider an evaluation of the synergies, co-benefits and conflicts between measures?		
5.9 Does the plan specify the measures' identification and selection mechanisms?		
5.10 Does the plan consider uncertainties related to the process of identification and selection of measures?		
5.11 Are roles and responsibilities for measure implementation defined?		
5.12 Does the plan define the implementation time for the measures?		
5.13 Does the plan consider prioritisation of measures for its implementation?		
5.14 Are funding opportunities for measure implementation considered?		
6. Participation		
Key evaluation questions	+ / ± / -	Comments
6.1 Has participation been included in the preparation of the plan? How? a. In the form of information b. In the form of consultation c. In the form of active participation d. In the form of active participation at all stages of its development		
6.2 Are the reasons and objectives for including participation in the plan explicit?		
6.3 Is social learning considered?		
6.4 Does the development of the plan consider stakeholder mapping ?		
6.5 Have all the identified stakeholders been involved?		
6.6 Has the diversity of sectors and interests involved been sufficiently represented to		

ensure the intersectoriality necessary for adaptation?		
6.7 Has specific material been developed to facilitate interaction with participants?		
6.8 Does the plan clearly indicates which information has been collected and how has the knowledge of participants been integrated in the plan?		
6.9 Have participants been given the opportunity to make an evaluation on the plan development process?		
6.10 Does the plan consider the revision of current governance structures and practices ?		
7. Implementation		
Key evaluation questions	+ / ± / -	Comments
7.1 Are barriers and opportunities for plan implementation indicated?		
7.2 Is there a commitment to implement the plan by the competent authorities?		
7.3 Is there an assessment of the level of synergy existing between the plan and the administrative and management context?		
7.4 Does the plan consider uncertainties related to possible inconsistencies between the definition of measures and their actual implementation?		
7.5 Has an impact assessment of the plan been considered?		
7.6 Does the plan foresee future revisions ?		
7.7 Does the plan foresee the inclusion of lessons learned from its implementation in future management cycles?		
7.8 Does the plan clearly indicate the organisms responsible for the plan's evaluation?		
7.9 Does the plan include a complete budget and entities that could contribute co-finance its implementation?		
7.10 Has the plan and supporting documents been structured with an approach that promotes transferability ?		
7.11 Does the plan consider developing public dissemination and awareness activities associated with its implementation?		

Documentation of the results of the Analytical Framework application to the TRBAP.

Table S3. Results of the Analytical Framework application to the Tordera River Basin Adaptation Plan. Categorisation of answers '+’ if the question is properly considered in the plan, '±’ if it is partially covered and '-’ if the question is not considered in the plan.

Analytical framework and key evaluation questions		
1. Basic information		
1.1 Title	Tordera River Basin Adaptation Plan ⁱ	
1.2 Promoter	European Commission	
1.3 Authors and type of entity they belong to	CREAF- public research center	
1.4 Year of publication	September 2016	
1.5 Temporal horizon	2018-2030	
1.6 Geographical scale	Tordera River Basin, Catalonia, Spain.	
1.7 General objective	Develop an Adaptation to Global Change Plan for the Tordera River Basin.	
1.8 Annexed or complementary documents to the plan included in the analysis.	Methodological documentation Results documentation Guidance Document	
2. Incidence area characterisation		
Key evaluation questions	+ / ± / -	Comments
2.1 Is a diagnosis made of the current status of the plan’s incidence area?	+	All available information has been collected and complemented with local knowledge.
2.2 Does the diagnosis include a pressure and impact analysis?	+	All available information has been collected and complemented with local knowledge.
2.3 Does the diagnosis integrate biophysical studies ?	+	Data from the Adaptations to Climate Change in Water Use project (ACCUA ⁱⁱ) complemented with local knowledge.
2.4 Does the diagnosis integrate socio-economic studies ?	+	Data from the ACCUA project complemented with local knowledge.
2.5 Does the diagnosis describe the political context ?	+	Basic research conducted together with specific interviews. Participants validated results.

2.6 Does the diagnosis describe the legal context ?	+	Basic research conducted together with specific interviews. Participants validated results.
2.7 Does the plan describe the methodologies used to carry out the diagnosis?	+	Methodology described in the plan. A specific participatory session with stakeholders dedicated to the diagnosis.
2.8 Are uncertainties related to the ecosystems and their functioning considered?	±	The studies carried out in the ACCUA project include uncertainties; these were complemented with local knowledge.
2.9 Are the information sources clearly indicated and are they accessible?	+	All documents accompanying the plan include exhaustive bibliographic references.
2.10 Does the diagnosis use information contained in other studies (scientific)?	+	Mainly: <ul style="list-style-type: none"> • ACCUA project, CREAM • Analysis of Pressures and Impacts (IMPRESSⁱⁱⁱ), Catalan Water Agency • Land Cover and Land Use Map, CREAM^{iv} • IDESCAT, Generalitat de Catalunya^v. • Information from the Plan for the Conservation of the Montseny Natural Park and Biosphere Reserve, Diputació de Barcelona^{vi}.
3. Incorporation of Climate change		
Key evaluation questions	+ / ± / -	Comments
3.1 Does the plan include climate change projections ?	±	Downscaling to the study area of ECHAM5 for IPCC A2 and B1 scenarios (ACCUA).
3.2 Is the time horizon of the projections used indicated?	+	2030
3.3 Do climate projections come from recognised organisms , as for example the IPCC?	+	Yes
3.4 Is the scale of the climate projections adequate for the scale of study? (Climate downscaling).	+	Yes

3.5 Does the plan evaluate the vulnerability of the ecosystems found in its incidence area?	+	Information from ACCUA project, and cognitive map ^{vii} .
3.6 Does the plan evaluate the social vulnerability of its incidence area?	+	Information from ACCUA project, and cognitive map.
3.7 Does the plan explain how ecosystems and social vulnerabilities have been evaluated?	+	Yes
3.8 Does the plan include a climate change impacts on the ecosystems present?	+	Information from ACCUA project, and cognitive map.
3.9 Does the plan include a climate change impacts on the socio-economic sectors present?	+	Information from ACCUA project, and cognitive map.
3.10 Does the plan indicate the methodologies used to evaluate climate change impacts?	+	Yes
3.11 Does the plan indicate which type of impact and vulnerability information has been used?	+	Yes
a. Is it quantitative information coming from modelling?	+	Information from ACCUA project.
b. Is it qualitative information?	+	Workshops and interviews with local stakeholders.
c. Is it semi-quantitative information?	+	Using the cognitive map
d. Is it information based on expert judgement?	+	Workshops and interviews with local stakeholders.
3.12 Are scientific uncertainties related to climate change projections and impacts on ecosystems considered?	±	Information from ACCUA project.
3.13 Does the plan clearly indicate its sources of information and are they accessible ?	+	All documents accompanying the plan include exhaustive bibliographic references.
3.14 Does the climate change section of the plan use information contained in other studies (scientific)?	+	Information from ACCUA project.
4. Structure and general content		
Key evaluation questions	+ / ± / -	Comments
4.1 Does the plan contain specific objectives ?	+	Yes
4.2 Does the plan contain the challenges it aims at tackling?	+	- Quantity and Quality of water. - Health of forest and water ecosystems. - Integrated water management.
4.3 Does the plan include a clear abstract ?	+	In English and Catalan

4.4 Does the plan include a glossary of concepts and terminology used?	+	Yes
4.5 Does the plan indicate its target audiences ?	+	Managers and responsible for the design and development of policies.
4.6 Is information included about the limitations of the plan?	+	The promoter and the authors do not have competencies for plan implementation.
4.7 Does the plan mention the complexity associated with the issues included in it?	+	Yes
4.8 Does the plan address in one way or another this complexity ?	±	Through mutual learning, knowledge transfer and active participation.
4.9 Is there a plan of measures ?	+	Yes
4.10 Does the plan include an implementation strategy ?	-	It does not fit into the objectives of the project.
4.11 Does the plan include a specific section on the measures' follow up ?	+	Yes
4.12 Does the follow-up section consider indicators ?	-	No, although the plan indicates the importance of an adequate development of indicators.
4.13 Does the follow-up section consider an associated budget ?	-	It does not fit into the objectives of the plan
5. Management measures		
Key evaluation questions	+ / ± / -	Comments
5.1 Does the plan contain an in depth description of the measures?	+	The plan has a dedicated section for in depth measure description.
5.2 Does the plan relate specific challenges to the measures that intend to tackle them?	+	Yes
5.3 Does the plan analyse the adaptive character of the measures included?	+	The results document, explains all characterization criteria used.
5.4 Are management measures categorised using adaptive criteria ? Flexibility, robustness, no-regret, win-win...	+	The detailed description of the measures indicates flexibility and robustness among other characteristics.
5.5 Does the plan consider characteristics for the measures such as:	+	Yes
a. feasibility	+	
b. acceptability	+	
c. preconditions	+	

5.6 Does the plan include an economic valuation of the measures?	±	Simplified economic valuation.
5.7 Does the plan include an impact assessment for the measures?	+	Indicated in the methodological and results documentation. Use of cognitive map and a sensitivity analysis.
5.8 Does the plan consider an evaluation of the synergies, co-benefits and conflicts between measures?	+	Indicated in the methodological and results documentation. Specific analysis validated by local stakeholders.
5.9 Does the plan specify the measures' identification and selection mechanisms?	+	Methodology explained in the documentation. Dedicated workshop and multi-criteria analysis.
5.10 Does the plan consider uncertainties related to the process of identification and selection of measures?	±	Specific workshop session to validate measure identification and selection.
5.11 Are roles and responsibilities for measure implementation defined?	+	For each measure, key actors and their possible contribution to the realisation of the measures were identified.
5.12 Does the plan define the implementation time for the measures?	+	Implementation time defined for each measure and validated by stakeholders.
5.13 Does the plan consider prioritisation of measures for its implementation?	±	Done within a workshop session.
5.14 Are funding opportunities for measure implementation considered?	+	Indicated in the detailed description of measures.
6. Participation		
Key evaluation questions	+ / ± / -	Comments
6.1 Has participation been included in the preparation of the plan? How?	+	Yes
a. In the form of information	+	Scientific information on climate change impacts and vulnerabilities available for stakeholders.
b. In the form of consultation	+	Specific interviews and surveys.
c. In the form of active participation	+	Local stakeholders involved in identifying and solving the challenges tackled in the plan.

d. In the form of active participation at all stages of its development	+	Iterative process of interaction at all stages of plan development.
6.2 Are the reasons and objectives for including participation in the plan explicit?	+	Functional to adaptive water management.
6.3 Is social learning considered?	+	Stakeholder workshop have a central role in the plan development.
6.4 Does the development of the plan consider stakeholder mapping ?	+	Yes
6.5 Have all the identified stakeholders been involved?	-	Most identified stakeholders were involved but not all of them.
6.6 Has the diversity of sectors and interests involved been sufficiently represented to ensure the intersectoriality necessary for adaptation?	±	The most relevant sectors and interest were represented.
6.7 Has specific material been developed to facilitate interaction with participants?	+	Specific materials developed for sessions, workshops dissemination and awareness raising activities.
6.8 Does the plan clearly indicates which information has been collected and how has the knowledge of participants been integrated in the plan?	+	The result document gives clear details.
6.9 Have participants been given the opportunity to make an evaluation on the plan development process?	-	Stakeholder evaluation of the process was collected at all participatory events.
6.10 Does the plan consider the revision of current governance structures and practices ?	+	Through concrete measures and recommendations to policy makers.
7. Implementation		
Key evaluation questions	+ / ± / -	Comments
7.1 Are barriers and opportunities for plan implementation indicated?	+	Through related information research and a session in a participatory workshop.
7.2 Is there a commitment to implement the plan by the competent authorities?	-	It is a limitation of the plan, although there is a strong interest of the stakeholders to promote its implementation.
7.3 Is there an assessment of the level of synergy existing between the plan and the administrative and management context?	+	Details in the description of measures.
7.4 Does the plan consider uncertainties related to possible inconsistencies between the	-	It is a limitation of the plan

definition of measures and their actual implementation?		
7.5 Has an impact assessment of the plan been considered?	-	It is a limitation of the plan
7.6 Does the plan foresee future revisions ?	-	It is a limitation of the plan
7.7 Does the plan foresee the inclusion of lessons learned from its implementation in future management cycles?	-	It is a limitation of the plan
7.8 Does the plan clearly indicate the organisms responsible for the plan's evaluation?	-	It is a limitation of the plan
7.9 Does the plan include a complete budget and entities that could contribute co-finance its implementation?	-	It is a limitation of the plan
7.10 Has the plan and supporting documents been structured with an approach that promotes transferability ?	+	Through the release and dissemination of the guidance document.
7.11 Does the plan consider developing public dissemination and awareness activities associated with its implementation?	+	A specific awareness and dissemination campaign.

ⁱ Broekman, A.; Sanchez, A.; Libbrecht, S.; Robert, N.; Verkerk, H. Results of the identification and evaluation of water management options for the Tordera River. 2016. Available online: http://bewaterproject.eu/images/results/adaptations-plans/Results_Tordera_final.pdf.

ⁱⁱ ACCUA. Adaptations to Climate Change in Water Use project. Memoria final. 2011. Available online: http://www.creaf.uab.cat/accua/ACCUA_divulgativa_internet.pdf (in Catalan).

ⁱⁱⁱ ACA, 2009. Aigua i canvi climàtic. Diagnosi dels impactes previstos a Catalunya. Available online: http://www.gencat.cat/mediamb/publicacions/monografies/aigua_canvi_climatic.pdf (in Catalan)

^{iv} CREAF, Land Cover and Land Use Map, LCMC (2005). <http://www.creaf.uab.es/mcsc/esp/index.htm> (in Spanish)

^v Idescat, Catalan Statistical Institute, (2012). <http://www.idescat.cat/en/>

^{vi} Conservation plan for the Montseny Natural Park and Biosphere Reserve (2014). <http://parcs.diba.cat/documents/155678/21045014/PlaConservacioMontseny.pdf/1f9cb5e7-50d7-4da2-8735-89ad4b52cfc3> (in Catalan)

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