



ECONADAPT Toolbox: Data repository

Deliverable number	DL10.5
Work Package Number	WP10
Submission date	29 November 2016
Type of Activity	RTD
Nature	R = Report
Dissemination level	Public

Document information

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Work Package Number	WP10
Deliverable number	DL10.5
Filename:	D10.5_ECONADAPT_Data_repository_29_11_2016.doc
Document history:	Final (version 2): 29 November 2016 Draft version (version 1): 17 November 2016
Type of Activity	RTD
Nature	R
Dissemination / distribution level	PU
Citation:	Tröltzsch, J.; Rouillard, J.; Lago, M.; Hasenheit, M. (2016): ECONADAPT Toolbox: Data repository. ECONADAPT deliverable 10.5.
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The ECONADAPT project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 603906.

To find out more about the ECONADAPT project, please visit the web-site:
www.econadapt.eu

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Executive Summary

The ECONADAPT data repository was developed to include cost and benefit estimates for adaptation measures and with this support the evaluation of climate adaptation activities on different scales. It contains cost and benefits which were compiled and estimated in the ECONADAPT Case study Work Packages 5-9. Furthermore, it includes information from reviews in the methods oriented WPs. It is developed in a web-based format <http://econadapt-toolbox.eu/data-sources>.

The ECONADAPT data repository is part of the ECONADAPT Toolbox. For more information on the toolbox see also D10.1: "ECONADAPT Web-Toolbox" which contains an overview on all different toolbox products.

This report explains the objectives, target group, structure and content of the data repository. The data repository is structured to deliver an easy access to estimated cost and benefit estimates of adaptation measures but also to interlink with the original documents which contain the estimation method and important assumptions used for the calculation which are essential for interpretation of results. The data repository contains 54 adaptation measures and 249 data sources.

Table of Contents

1	INTRODUCTION	1
2	AIM AND TARGET GROUP OF THE ECONADAPT DATA REPOSITORY	1
3	STRUCTURE OF THE ECONADAPT DATA REPOSITORY	1
4	ADAPTATION MEASURES AND DATA SOURCES INCLUDED IN THE ECONADAPT DATA REPOSITORY.....	3
	ADAPTATION MEASURES.....	3
	SEARCHING FOR ADAPTATION MEASURES	6
5	LINKS TO ONLINE-PRODUCTS	8
	LINK TO THE ECONADAPT WEB-TOOLBOX.....	8
	SOURCES FOR DATA ON COSTS AND BENEFITS OF ADAPTATION.....	8
	LIBRARY OF PUBLICATIONS RELATED TO ADAPTATION ECONOMICS	8
	FURTHER POLICY BRIEFS; VIDEO SUMMARIES AND DELIVERABLES OF THE PROJECT	8
	INSIGHTS INTO THE ECONOMICS OF ADAPTATION	8

1 Introduction

The ECONADAPT data repository was developed to include cost and benefit estimates. It contains cost and benefits which were compiled and estimated in the ECONADAPT Case study Work Packages 5-9. Furthermore, it includes information from reviews in the methods oriented WPs. It is developed in a web-based format <http://econadapt-toolbox.eu/data-sources>.

With the web-based format, the data repository allows easy access to cost and benefit estimates for adaptation measures for policy-makers, civil servants or consultants. The compiled data sources can be used to get an easy and quick overview on available estimate as well as background information on the estimation of adaptation costs on national, regional or local level.

The ECONADAPT data repository is part of the ECONADAP Toolbox. For more information on the toolbox see also D10.1: "ECONADAPT Web-Toolbox" which contains an overview on all different toolbox products.

This report explains the objectives, target group, structure and content of the data repository.

2 Aim and target group of the ECONADAPT data repository

The objective of the data repository is an easy and fast access to values for estimation of costs and benefits of adaptation measures. A well-structured overview of values for costs and benefits parameters which were used in different ECONADAPT WPs and case studies should be established. The data repository should deliver information and guidance for the usage of these estimates.

The data-repository webpage is prepared for users, who are interested in costs and benefits of various adaptation measures. Visitors who would like to get an overview on the estimates or would like to use and transfer existing values from literature for their own analyses. It could be beneficial for public services and agencies, national, regional and local authorities, and consultancies.

3 Structure of the ECONADAPT data repository

The data repository is an important part of the ECONADAPT Toolbox. The repository is embedded in the ECONADAPT Web-Toolbox. It is integrated as an own menu item. The structuring of the data sources is done via adaptation measures.

The development of the data repository included several discussions within the ECONADAPT project team as well as with stakeholders. Discussions focused on the level of detail and the type of information which should be presented in the web-based data repository. The discussions clearly showed that stakeholders are interested in accessing cost and benefit

information for different adaptation measures. It became clear that a large variety of methodological approaches were used for the estimation of costs and benefit values which hinders an easy and quick comparability between different estimates. Additionally, information on the methods and assumptions used for the estimation of the values was not in all relevant literature documents transparently explained and therefore available. So as not to mislead potential users of estimates, we decided to focus the database on a gateway to the original data sources. It contains an overview of relevant data sources, information on the methods used, the adaptation measures assessed and the context (case studies) in which they were assessed.

The section for each adaptation measure on the website includes a short description of the adaptation measure and a list of data sources.

Users can search the adaptation measures via relevant policy areas and related climate risks. 11 policy areas are covered and can be searched: agriculture, biodiversity, buildings & construction, civil protection & disaster risk management, coastal protection, energy, forestry, human health, transport and water management. Five related climate risks can be used for the search of adaptation measures: heatwave, increased storminess, sea level rise, water scarcity & droughts and flooding.

The data sources represent individual literature documents including cost and benefit estimates. For each data source several information categories are included to guide users to the suitable estimates for their adaptation context: Title, author(s), country, climate risks considered and methodological approach (see following table).

The information is related to each adaptation measure, e.g. for the same data source different information can be included for country, climate risks considered or methodological approach e.g. if regional case studies analysed different adaptation measures and their results are summarized in one document.

For each data source following information are included:

Table 1: Information per data source

Title of data source	Author(s) of data source	Country	Climate risks considered	Methodological approach
Title, including link to full bibliographic information in ECONADAPT library	Listed author(s)	All countries, transnational regions for which data is available	Selected from five climate risks: heatwave, increased storminess, sea level rise, water scarcity & droughts and flooding	Specifics on used method, further specifics on adaptation measure, in case of case studies: details on city or region, if available rough indication of decision criteria, such as Net Present Value or Cost benefit ratio

4 Adaptation measures and data sources included in the ECONADAPT data repository

For the ECONADAPT data repository, cost and benefits reviewed and used for different case studies in WP 5-9 is included. Furthermore, results from literature reviews in WP 1 and 3 are integrated. Therefore, the costs and benefit values cover a broad range of policy areas which were analysed in the project, e.g. health, water management, transport, agriculture, biodiversity, coastal protection, disaster risk management and building & construction.

The data repository contains 54 adaptation measures and 249 adaptation sources.

Adaptation measures

The following **adaptation measures** are covered:

Agriculture

Adjusting crop rotation schemes and planting and harvesting dates	Land use change
Buffer strips, green belts	Reduced and conservation soil tillage
Crop cover, catch crops	Residue management
Improved irrigated agriculture	Water meters installation

Biodiversity

Floodplain management	Protection of Coral Reefs
Forest rehabilitation and sustainable forest management	Sustainable Urban Drainage System
Improved forest fire-fighting and prevention	Wetland restoration
Land use change	

Buildings & construction

Construction of adapted buildings	Protection of buildings to flooding
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Civil protection & disaster risk management

Barriers and retention basins against natural hazards	Protection of buildings to flooding
Dike reinforcement and heightening	Soft coastal defence
Early warning system for flooding	

Coastal protection

Dike reinforcement and heightening	Soft coastal defence
Managed coastal realignment	

Energy

Adaptation of power stations and electricity grid	Adapted and additional air conditioning
Adaptation of energy demand	Construction of adapted buildings

Forestry

Forest rehabilitation and sustainable forest management	Land use change
Improved forest fire-fighting and prevention	

Human Health

Early heat warning systems and emergency plans	Urban planning (to provide cooling effect)
Education and information on avoiding diseases	Vaccination
Surveillance and monitoring for disease control	Vector control for destruction of infection
Treatment and prevention of diseases	

Transport

Adaptation regarding ship design and shipping infrastructure	Retrofitting airports
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Adaptation of rail infrastructure	Retrofitting existing road infrastructure
Improvement of waterflow management	Vegetation management along roads and rails
Protection of buildings to flooding	

Water management

Additional water abstraction and distribution	Improved/additional water treatment
Additional water storage and distribution	Protection of buildings to flooding
Awareness-raising and education campaign on water savings	Rainwater harvesting
Barriers and retention basins against natural hazards	Sustainable Urban Drainage System
Desalination	Water aquifer storage and recovery
Dike reinforcement and heightening	Water leakage control
Early warning system for flooding	Water meters installation
Establishing market mechanisms for water	Water reuse
Improved irrigated agriculture	Water transfer

Searching for adaptation measures

Users can look directly for concrete adaptation measures and their costs and benefits (via a list) or can search at first for suitable adaptation measures for their adaptation project or programme. In the screenshot (figure 1) below you can see the direct entry via the list of measures, but also the different search criteria (policy areas and impacts) which will limit the number of suitable adaptation measures (e.g. figure 2).

The overview in figure 3 will appear if a certain adaptation measure is chosen from the list. The information for the individual data source is presented in a structure way and includes first information on the used methodology for the estimated costs and benefits – to enable the user to find the most suitable sources easily.

Users can directly choose adaptation measures via a list of the included options.

Figure 1: Screenshot of data repository: search criteria and list of options

The screenshot shows the ECONADAPT TOOLBOX website. At the top, there is a navigation bar with links for POLICY CHALLENGES, METHODS, INSIGHTS, DATA SOURCES, and EASY ACCESS GUIDE. Below this is a section titled 'DATA SOURCES' with a sub-section 'ADAPTATION OPTIONS'. The 'ADAPTATION OPTIONS' section displays 21 items, each with a small icon and a brief description. Above this list, there are two columns of checkboxes for filtering: 'POLICY AREA' and 'CLIMATE RISKS'. The 'POLICY AREA' column includes Agriculture, Biodiversity, Building & Construction, Civil protection & disaster risk management, Coastal protection, Energy, Finance & insurance, Fisheries, Forestry, Human health, Industry, Other, Regional & urban planning, Tourism, Transport, and Water management. The 'CLIMATE RISKS' column includes Heatwave, Increased storminess, Sea level rise, Water scarcity & droughts, and Flooding. The overall background is light orange, and the text is in a sans-serif font.

ADAPTATION OPTIONS			
Additional water storage and distribution	Protection of buildings from flooding		
Additional water storage and distribution	Rainwater harvesting		
Assessing, managing and adapting to climate change	River restoration		
Better and more sustainable drainage systems against coastal hazards	Soft coastal defence		
De-alarmation	Sustainable Urban Drainage Systems		
Dike reinforcement and upgrading	Water infiltration and recovery		
Early warning system for flooding	Water leakage control		
Establishing market mechanisms for water	Water meter installation		
Groundwater management	Water reuse		
Increased/different water treatment	Water transfer		

Figure 2: Screenshot of data repository: adaptation options for coastal protection

The screenshot shows the ECONADAPT Toolbox website. At the top, there is a navigation bar with links to 'POLICY CHALLENGES', 'METHODS', 'INSIGHTS', 'DATA SOURCES', and 'EASY ACCESS GUIDE'. Below this, a yellow header bar says 'DATA SOURCES'. The main content area has a light orange background. It starts with a paragraph about the ECONADAPT project reviewing 21 adaptation measures. Below this is a 'POLICY AREA' section with checkboxes for Agriculture, Biodiversity, Buildings & construction, Civil protection & disaster risk management, and Coastal protection. To the right is a 'CLIMATE RISKS' section with checkboxes for Energy, Finance & insurance, Fisheries, Forestry, Human health, Industry, Other, Regional & urban planning, Tourism, Transport, Water management, Heatwave, Increased storminess, Sea level rise, Water scarcity & droughts, and Flooding. Underneath these sections is a 'ADAPTATION OPTIONS' section with a sub-section titled 'Displaying 1 of 21'. This section contains two buttons: 'Data requirements and benefit finding' and 'Soft institutional delivery'. At the bottom, there is a 'DATA SOURCES' section with a sub-section titled 'Please choose an adaptation option from the list above to see the data sources available'.

Figure 3: Screenshot of data repository: overview of data sources for each adaptation option

This screenshot shows a detailed view of data sources for water use efficiency. At the top, it says 'WATER USE EFFICIENCY' with a sub-section 'To encourage uptake of technologies capable of achieving the same function of previously used technologies with less water'. Below this is a table with columns for 'Data source', 'Author', 'Country', 'Climate risk considered', and 'Methodological approach'. There are four rows of data:

Data source	Author	Country	Climate risk considered	Methodological approach
Climate Change Impacts and Adaptation: Quantify the Cost of Impacts and Adaptation	Metcalf & Rosen	US	Water scarcity & droughts	The reduction of water use by white good industries and retrofit of houses. Two case studies in SE England and SE Scotland. Net benefit estimated as difference between
Adapting hydroelectric power systems to climate change	Anderson, J.M.	Australia	Water scarcity & droughts	Case Study for Sydney, including a set of adaptation options: leakage reduction program; water efficiency labelling; rebates for rainwater tank; recycled water for
Climate change and water management: A review for California	Tianya, Stacy K., Zhi Tang, Lund, Jay R., Howitt, Richard E., Jenkins, Mario W., Pablos, Manuel A., Tashee, Melaine, Ritzena, Randall S., Terrena, Irene C.	US	Water scarcity & droughts	Cost and damage assessment of different adaptation options for California, use of twelve distinct climate warming scenarios, uses integrated model (Large-scale economic)
Water resource planning under climate uncertainty in London	Duth, G., Arkell, B., Tradewell, J.	UK	Water scarcity & droughts	Asses effects of long term climate uncertainty on investment planning in London, including impact on reliability of resources, on cost-effectiveness of supply-demand options

At the bottom, there is a footer with the ECONADAPT logo and a link to the project website: www.econadapt.eu.

5 Links to online-products

Link to the ECONADAPT Web-Toolbox

<http://econadapt-toolbox.eu/>

Sources for data on costs and benefits of adaptation

<http://econadapt-toolbox.eu/data-repository>

Library of publications related to adaptation economics

<http://econadapt-library.eu/>

Further policy briefs; video summaries and Deliverables of the project

<http://econadapt.eu/>

Insights into the economics of adaptation

Detailed information is available [here](#).

Framing of adaptation economics

Framing adaptation economics in decision-making: a policy-led framework
Sourcing and using climate information for economic assessments of adaptation
Agriculture: Cost & benefits of adaptation
Biodiversity and ecosystem services: cost & benefits of adaptation
Coastal zones: cost & benefits of adaptation
Energy: Cost & benefits of adaptation
Health: Cost & benefits of adaptation
Infrastructure: cost & benefits of adaptation
Water and flood management: cost & benefits of adaptation

Micro-economic foundations

Framework for evaluating system-wide adaptation
Accounting for uncertainties for spatial development and adaptation to climate change
Evaluating adaptation options through the elicitation of preferences
Use of discounting in adaptation
Dealing with changing preferences over time
Treatment of future learning: Acceptable Risks Analysis
Treatment of future learning: Real Options Analysis

Scaling, aggregation and transfer

- [Private adaptation of adaptation goods: potential and policy instruments](#)
- [Integrating distributional objectives in the cost-benefit analysis of adaptation options](#)
- [The Use of Non-Monetary Metrics to Assess Adaptation Actions: Multi-Criteria Analysis](#)
- [The Use of Non-Monetary Metrics to Assess Adaptation Actions: Cost-Effectiveness Analysis](#)
- [Transferring values between locations in climate change adaptation](#)
- [Applying alternative discounting rules: the Equivalency Principle](#)

Treatment of uncertainty and risks

- [Uncertainties and causes of uncertainties in climate change adaptation](#)
- [Uncertainties and risk analysis in climate change adaptation](#)
- [Integrated uncertainties and risk management for robust decision making](#)
- [Methods for expressing risk and ambiguity in economic analysis](#)
- [Assessing systemic risks in adaptation](#)

Economic project appraisal

- [Appraisal of adaptation to river flood at the Vltava river, Prague](#)
- [Appraisal of adaptation to river and coastal flood in Bilbao](#)

Policy Impact Assessment

- [Adaptive management of rural land use systems: the Common Agricultural Policy](#)
- [Risk attitudes and preferences for adaptation in agriculture](#)
- [Stochastic modelling for robust decision making: the Common Agricultural Policy](#)

International development support

- [Prioritisation of adaptation in the development context: Rwanda](#)
- [Prioritisation of adaptation in the development context: Zanzibar](#)

Disaster risk management

- [Assessing flood risk management: The Netherlands](#)
- [Assessing flood risk management: Czech Republic](#)
- [Assessing flood risk management: Austria](#)
- [Assessing flood risk management: United Kingdom](#)
- [Fiscal consequences of extreme weather risks in Europe](#)

Macro-economic effects of adaptation

- [The role of autonomous adaptation in global assessments at global level](#)
- [Economy-wide implications of planned adaptation: the case of sea level rise](#)
- [Economy-wide implications of planned adaptation: the case of agriculture](#)