

Thank you for taking the time for this questionnaire! I appreciate it very much!

I am a **master's student** at the **Technical University of Munich** in the ecological engineering program. This questionnaire is part of my **semester project on flood management of rural European mountain areas**. My project relates to the **PHUSICOS project** (<https://phusicos.eu/>) that received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 776681. My **supervisors** are **Dr. Aude Zingraff-Hamed** and **Dr. Gerd Lupp**. Please feel free to direct any question or concerns to us! (f.conitz@tum.de, aude.zingraff-hamed@tum.de, gerd.lupp@tum.de)

The survey is designed to take no longer than 20 minutes.

You will be asked some anonymous socio-professional information like years of working in flood management and your specialisations. Then you will be asked about your expert opinion on the general suitability of flood measures or classes of measures, necessary characteristics or properties, and their effect on nature, society, and the economy. **You can skip any question or page if you are not comfortable answering.**

I highly appreciate your participation in this questionnaire!

Kind regards,

Felix Conitz

Engineering Ecology (M. Sc.)

Technical University of Munich, Germany

You are being invited to participate in this research study on “Flood management in rural European mountain areas”. You were contacted to participate in this study because you have dealt with flood management in the past.

Your participation in this research study is entirely voluntary. You may choose not to participate. If you choose to participate, you may opt-out of taking part at any time.

Any information you provide is of course optional, and will be kept confidential. However, as with any online related activity, the risk of a breach is always possible. All data is stored in a password protected electronic format.

The results of this survey will be used for scientific purposes only.

You are entitled to receive information on the origin, recipient and purpose of your stored data, at any time and free of charge. Further, you have the right to demand data corrections, blocking or deletion. Concerning this subject and further data protection related issues, you can contact f.conitz@tum.de at any time.

By clicking “Yes, I agree” below you are indicating that you are at least 18 years old, have read and understood this consent form and agree to participate in this research study.

If you do not wish to participate please click “No, I decline” below.

☐ No, I decline (do not participate in this study)

☐ Yes, I agree

1. How long have you been working in the sector of flood management or related topics?

Please write down the years of working experience with floods.

i.e. 42

Years

2. What kind of organisation or institution do you belong to?

Please select one choice (the most relevant) from the dropdown menu.

[Please choose]

**3. What is your broader field of focus in flood management (context)?**

Mark either one context or several to indicate a combined context (e.g. marking social and economic equals socio-economic).

☐ Social

☐ Ecological

☐ Economic

☐ Technical

☐ Other

4. In which region or country does your work in flood management primarily take place?

Please mention the most relevant site where you are working. That could be an entire continent, if you work in multiple countries, a specific country (e.g. Germany), or a region (either transnational e.g. Alps, or intranational e.g. Harz). For Europe, please use the site codes from the EU-NUTS-System (<https://ec.europa.eu/eurostat/en/web/nuts/national-structures>) and decide on a NUTS-level that best describes your geographic area (e.g. the region code where most of your work is located in).

Site

5. Which spatial dimensions and landscape context are you working in?

Check as many characteristics as needed.

Urban

☐

Rural

☐

Mountain areas

☐

Lowlands

☐

Coastal areas

☐

Inland water bodies

☐

Other

☐

On the following three pages you will be asked to **evaluate the same measures** used in flood management embedded **in a different context, each time**. The measures are to be interpreted as indicated by the examples in parentheses [Measure (examples)].

First, the measures are to be evaluated on their **functionalities**.

Second, the measures are to be evaluated on their **suitability** for **rural European mountain areas**.

Third, the measures are to be evaluated on their **spatial effect**.

6. Which aspect(s) (flood reduction, technology, environment, economy, society) can be covered by a flood measure?

1. Evaluation of measures: **Functionalities.**

Check the box (multiple selections possible)...

- “**Simple technology**” if a measure has **low resource demand** in terms of labour and material, or knowledge,
- “**Environmental benefit**” if a measure **improves issues in nature** i.e. water or soil quality, biological diversity,
- “**Economic benefit**” if a measure revitalises and facilitates a **diverse local economy**, and
- “**Social benefit**” if a measure encourages **society values and function** i.e. integrated governance, cultural heritage, quality of life, enhancement of infrastructure.
- “**Limited experience**” if you know of a measure but **lack experience** with it, and
- “**More Information**” if the measure **description is too general**.

Check the box (single selection) “**None**” if you are not able to give an evaluation.

*The measures are to be interpreted as indicated by the examples in parentheses. In the case of “Water catchment area restoration (...)” is meant a broad understanding of watershed and large-scale application of measures compared to other natural solutions.

Natural Solutions

Environmental and ecological preservation

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Water catchment area restoration (rewetting, rewilding, temporal flooding of areas)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Terrestrial ecosystem and habitat restoration (drylands, wetlands)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

River restoration (Living River Strategy, Room for the River)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Sponge vegetation restoration (replanting woods, bushes, reed zones)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Engineered Solutions

Catchment area modifications (terracing, relocation of embankments)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

River modifications (grand ox, dredging, channeling, BioGrout, walls, dams, levee, sleeper, protection from log jam)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Soft flood water retention (polder, swale)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Constructed water retention (water retention basin, reservoir, or pond)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Water retention slowdowns and drainage systems (weirs, sluice, bypasses, throttle, sewer tunnel, siphon, pumping systems)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Mobile embankments (sandbags, TubeBarrier, Water-Gate)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Urban and Rural Planning Solutions

Flood-adapted infrastructure (bridges, railway dams, pedestrain dams, vehicles, boats)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Flood-adapted architecture & dry or wet building (stilt house, architrave block house, water shutter, adobe walls, fences)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Land Use & Land Management Solutions

Diverse and heterogenous land management (land use planning, zoning, subdivision ordinance, land acquisition)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Managed retreat (e.g. translocation of settlement)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Lifestyle and livelihood (up-and-downhill migration, agriculture, aquaculture, fishery, water retention)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Flood-based farming (paludiculture, [rain] water resource management, inundation canals, depression agriculture)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Extensification (land use or land cover transformation, ecological practice, or conversions)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Water and soil protection (rotating, intercropping, catch crop, mulch, green manure)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Governance Solutions

Official frameworks (building code, guidelines, directives, laws, legislative instruments, plans, projects, programs)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Cooperative society (participation, communication, organisation, goninggumi, family & friends, microfincancing, rituals)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Emergency preparation (rescue, flood emergency reservoir)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Evacuation system (location of evacuation areas and evacuation routes)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Compensation system (state or index-based insurance, flood-prone ID)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Analysis of management practices (failures and successes)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Inclusion of knowledge (also indigenous, local, ecological) & provision of education (i.e. marks)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Media and telecommunication (TV, radio, internet, phones)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Warning system (yells, movements, instruments, EFAS, GloFAS, GFDS, WeSenseIT)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

Hydro-geo-information (mapping, forecasting, database, remote sensing, modelling, future risk analysis)

Flood reduction	Simple technology	Environ. benefit	Economic benefit	Social benefit	Limited experience	More information	None
-----------------	-------------------	------------------	------------------	----------------	--------------------	------------------	------

7. Which of the following measures in flood management could be applied in rural mountain areas across Europe?

2. Evaluation of measures: **Suitability for rural European mountain areas.**

Please rate the measures by sliding the stick figure between “Rarely applicable” (1) and “Totally applicable” (5), or you can also **leave the stick figure on “Not Available”** if you are not able to give a rating.

*The measures are to be interpreted as indicated by the examples in parentheses. In the case of “Water catchment area restoration (...)” is meant a broad understanding of watershed and large-scale application of measures compared to other natural solutions.

in rural European mountain area

Rarely applicable Totally applicable
Not Available



Natural Solutions

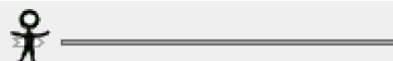
Engineered Solutions

Urban and Rural Planning Solutions

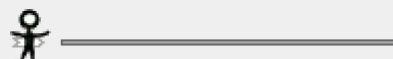
Land Use & Land Management Solutions

Governance Solutions

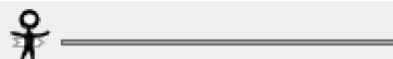
Environmental and ecological preservation



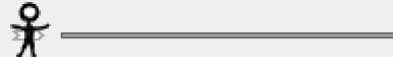
Water catchment area restoration (rewetting, rewilding, temporal flooding of areas)



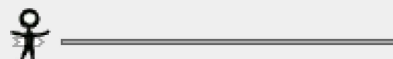
Terrestrial ecosystem and habitat restoration (drylands, wetlands)



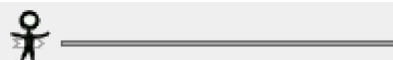
River restoration (Living River Strategy, Room for the River)



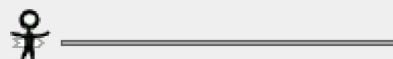
Sponge vegetation restoration (replanting woods, bushes, reed zones)



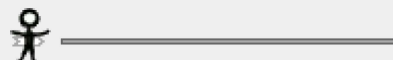
Water catchment area modifications (terracing, relocation of embankments)



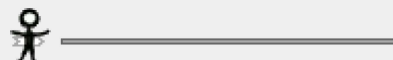
River modifications (grand ox, dredging, channeling, BioGrout, walls, dams, levee, sleeper, protection from log jam)



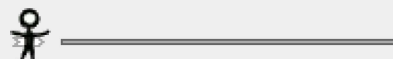
Soft flood water retention (polder, swale)



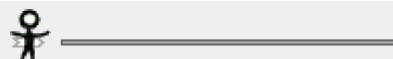
Constructed water retention (water retention basin, reservoir, or pond)



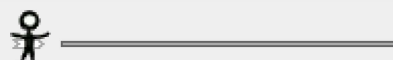
Water retention slowdowns and drainage systems (weirs, sluice, bypasses, throttle, sewer tunnel, siphon, pumping systems)



Mobile embankments (sandbags, TubeBarrier, Water-Gate)



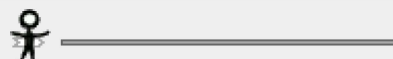
Flood-adapted infrastructure (bridges, railway dams, pedestrian dams, vehicles, boats)



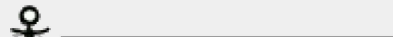
Flood-adapted architecture & dry or wet building (stilt house, architrave block house, water shutter, adobe walls, fences)



Diverse and heterogenous land management (land use planning, zoning, subdivision ordinance, land acquisition)



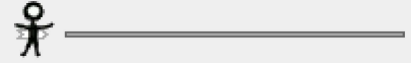
Managed retreat (e.g. translocation of settlement)



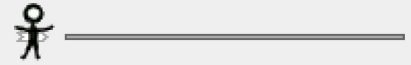
Lifestyle and livelihood (up-and-downhill migration, agriculture, aquaculture, fishery, water retention)



Flood-based farming (paludiculture, [rain] water resource management, inundation canals, depression agriculture)



Extensification (land use or land cover transformation, ecological practice, or conversions)



Water and soil protection (rotating, intercropping, catch crop, mulch, green manure)



Official frameworks (building code, guidelines, directives, laws, legislative instruments, plans, projects, programs)



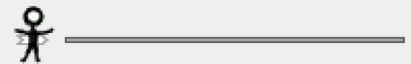
Cooperative society (participation, communication, organisation, goninggumi, family & friends, microfinancing, rituals)



Emergency preparation (rescue, flood emergency reservoir)



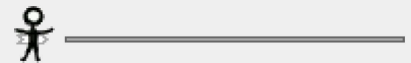
Evacuation system (location of evacuation areas and evacuation routes)



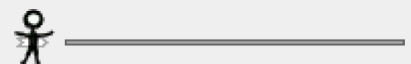
Compensation system (state or index-based insurance, flood-prone ID)



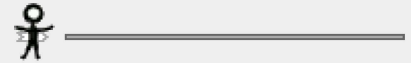
Analysis of management practices (failures and successes)



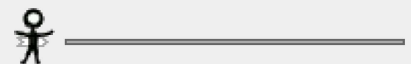
Inclusion of knowledge (also indigenous, local, ecological) & provision of education (i.e. marks)



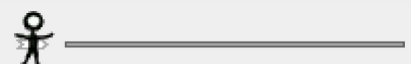
Media and telecommunication (TV, radio, internet, phones)



Warning system (yells, movements, instruments, EFAS, GloFAS, GFDS, WeSenseIT)



Hydro-geo-information (mapping, forecasting, database, remote sensing, modelling, future risk analysis)



8. What is the spatial impact or effect of a measure?

3. Evaluation of measures: **Spatial effect.**

Check the box (multiple selection possible)...

- **"Local"** if a measure effects **within 100 km** radius,
- **"Regional"** if a measure effects **within 250 km** radius,
- **"Extraregional"** if a measure effects **beyond 250 km** radius (intranational, national or transnational), **or**
- **"Not Available"** if no option can be given.

to specify a measure's **spatial performance** .

*The measures are to be interpreted as indicated by the examples in parentheses. In the case of "Water catchment area restoration (...)" is meant a broad understanding of watershed and large-scale application of measures compared to other natural solutions.

Natural Solutions

Environmental and ecological preservation

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

Water catchment area restoration (rewetting, rewilding, temporal flooding of areas)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

Terrestrial ecosystem and habitat restoration (drylands, wetlands)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

River restoration (Living River Strategy, Room for the River)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

Sponge vegetation restoration (replanting woods, bushes, reed zones)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

Engineered Solutions

Water catchment area modifications (terracing, relocation of embankments)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

River modifications (grand ox, dredging, channeling, BioGrout, walls, dams, levee, sleeper, protection from log jam)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

Soft flood water retention (polder, swale)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

Constructed water retention (water retention basin, reservoir, or pond)

Local	Regional	Extraregional	Not Available
-------	----------	---------------	---------------

Water retention slowdowns and drainage systems (weirs, sluice, bypasses, throttle, sewer tunnel, siphon, pumping systems)			
Local	Regional	Extraregional	Not Available

Mobile embankments (sandbags, TubeBarrier, Water-Gate)			
Local	Regional	Extraregional	Not Available

Urban and Rural Planning Solutions

Flood-adapted infrastructure (bridges, railyway dams, pedestrain dams, vehicles, boats)			
Local	Regional	Extraregional	Not Available

Flood-adapted architecture & dry or wet building (stilt house, architrave block house, water shutter, adobe walls, fences)			
Local	Regional	Extraregional	Not Available

Land Use & Land Management Solutions

Diverse and heterogenous land management (land use planning, zoning, subdivision ordinance, land acquisition)			
Local	Regional	Extraregional	Not Available

Managed retreat (e.g. translocation of settlement)			
Local	Regional	Extraregional	Not Available

Lifestyle and livelihood (up-and-downhill migration, agriculture, aquaculture, fishery, water retention)			
Local	Regional	Extraregional	Not Available

Flood-based farming (paludiculture, [rain] water resource management, inundation canals, depression agriculture)			
Local	Regional	Extraregional	Not Available

Extensification (land use or land cover transformation, ecological practice, or conversions)			
Local	Regional	Extraregional	Not Available

Water and soil protection (rotating, intercropping, catch crop, mulch, green manure)			
Local	Regional	Extraregional	Not Available

Governance Solutions

Official frameworks (building code, guidelines, directives, laws, legislative instruments, plans, projects, programs)			
Local	Regional	Extraregional	Not Available

Cooperative society (participation, communication, organisation, goninggumi, family & friends, microfincancing, rituals)			
Local	Regional	Extraregional	Not Available

Emergency preparation (rescue, flood emergency reservoir)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

Evacuation system (location of evacuation areas and evacuation routes)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

Compensation system (state or index-based insurance, flood-prone ID)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

Analysis of management practices (failures and successes)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

Inclusion of knowledge (also indigenous, local, ecological) & provision of education (i.e. marks)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

Media and telecommunication (TV, radio, internet, phones)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

Warning system (yells, movements, instruments, EFAS, GloFAS, GFDS, WeSenseIT)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

Hydro-geo-information (mapping, forecasting, database, remote sensing, modelling, future risk analysis)

<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Extraregional	<input type="checkbox"/> Not Available
--------------------------------	-----------------------------------	--	--

On the **last two pages** you will be asked about the **importance of certain steps and characteristics of flood management**, respectively.

Please bring all shown items into an increasing order of importance, being "1" most important.

Parantheses will indicate how to interpret the described steps of flood management.

9. How important are certain flood management aspects like prevention, protection, reaction, and lessons learnt to you?

Rank all items by drag-and-drop them in the column in order of importance in flood management according to your best judgement. (1 = important to 15 = unimportant)

Natural water retention (e.g. sponge vegetation)	Technical flood defense (e.g. levee)	1 (important)
Land use regulation (e.g. zoning)	Building codes (e.g. flood-prone ID)	2
Building retrofitting (e.g. water shutter)	Insurance (e.g. refunding)	3
Training or exercises (e.g. workshop)	Early warning systems (e.g. EFAS)	4
Emergency measures (e.g. evacuation, sandbag wall)	Relief (e.g. first aid, food, clothes)	5
	Rehabilitation (e.g. clean up, viable infrastructure)	6
Reconstruction (e.g. damaged levees)	Event documentation (e.g. marks, resource demand)	7
Data analysis, modelling and mapping (e.g. flood risk maps)	Risk assessment and evaluation of measures (e.g. failures and successes)	8
		9
		10
		11
		12
		13
		14
		15 (unimportant)

10. How should flood management be?

Rank all items by drag-and-drop them in the column in order of importance in flood management according to your best judgement. (1 = important to 15 = unimportant)

Modular	Complementary	1 (important)
Redudant	Adaptive	2
Robust	Transformable	3
Resilient	Flexible, agile	4
Social, accepted, communicative, participative, collective	Cost-effective	5
	Sustainable, long-term	6
Multifunctional	Ecosystematic integral	7
Decentralized	Heterogenic	8
Climate fair	Feasible	9
Strategic, smart	Holistic	10
		11
		12
		13
		14
		15
		16
		17
		18
		19 (unimportant)

11. Missing anything?

Please enter what you would want to add or comment on (e.g. a topic or measure not mentioned).

12. Contact Information

Please enter your work- email address for a potential follow-up survey. This survey tool collects your e-mail address separately from your responses.

☐ I am interested in **the results of this study**. Please send me an abstract by e-mail.

Done!

Thank you for your participation. Your expertise will greatly help in the development of flood management in rural mountain areas in Europe.

If you have something to share, don't hesitate to contact f.conitz@tum.de, aude.zingraff-hamed@tum.de or gerd.lupp@tum.de.

Please click "Next" to complete the survey!

Best regards,

Felix Conitz

Engineering Ecology (M. Sc.), Technical University of Munich, Germany

Last Page

Thank you for completing this questionnaire!

Your answers were transmitted, you may close the browser window or tab now.