Climate adaptation tools under scrutiny: risks to just and sustainable adaptation in the Mediterranean

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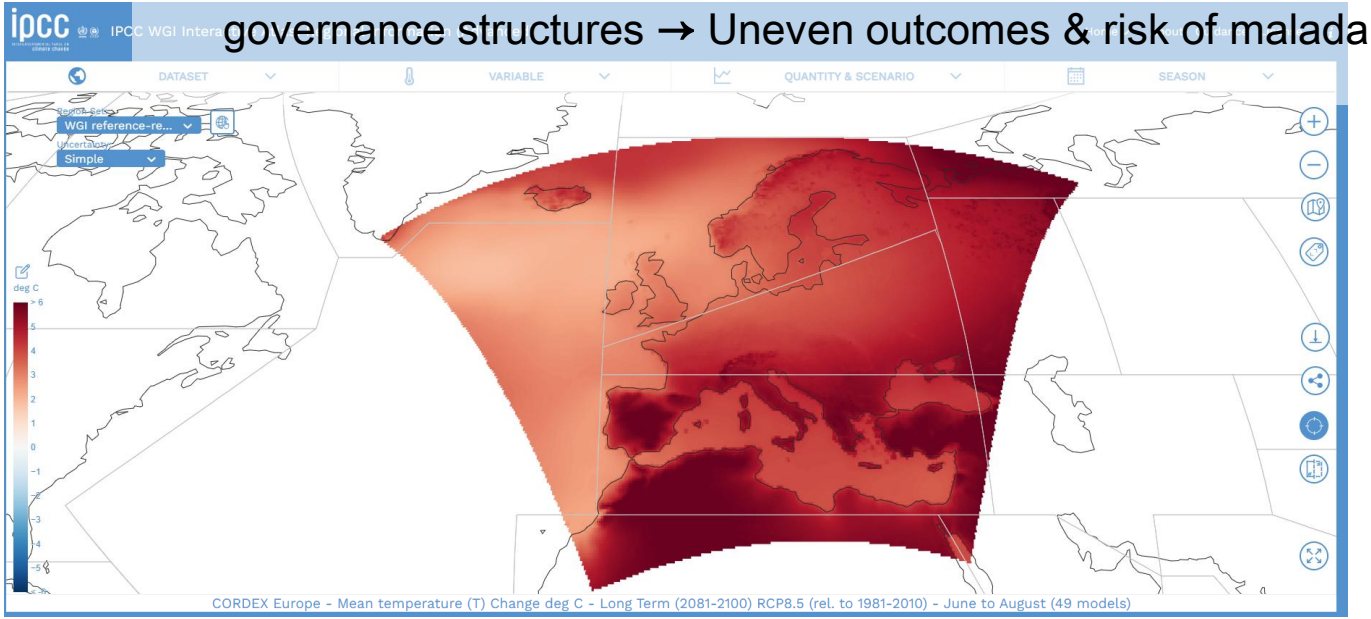
Climate adaptation in the Mediterranean

- Mediterranean = climate change hotspot (heatwaves, droughts, floods, biodiversity loss)
- Adaptation remains fragmented due to political, cultural, and institutional diversity
- Uneven institutional & social capacity, limited localized data & finance, fragmented governance structures → Uneven outcomes & risk of maladaptation



Source: https://interactive-atlas.ipcc.ch/

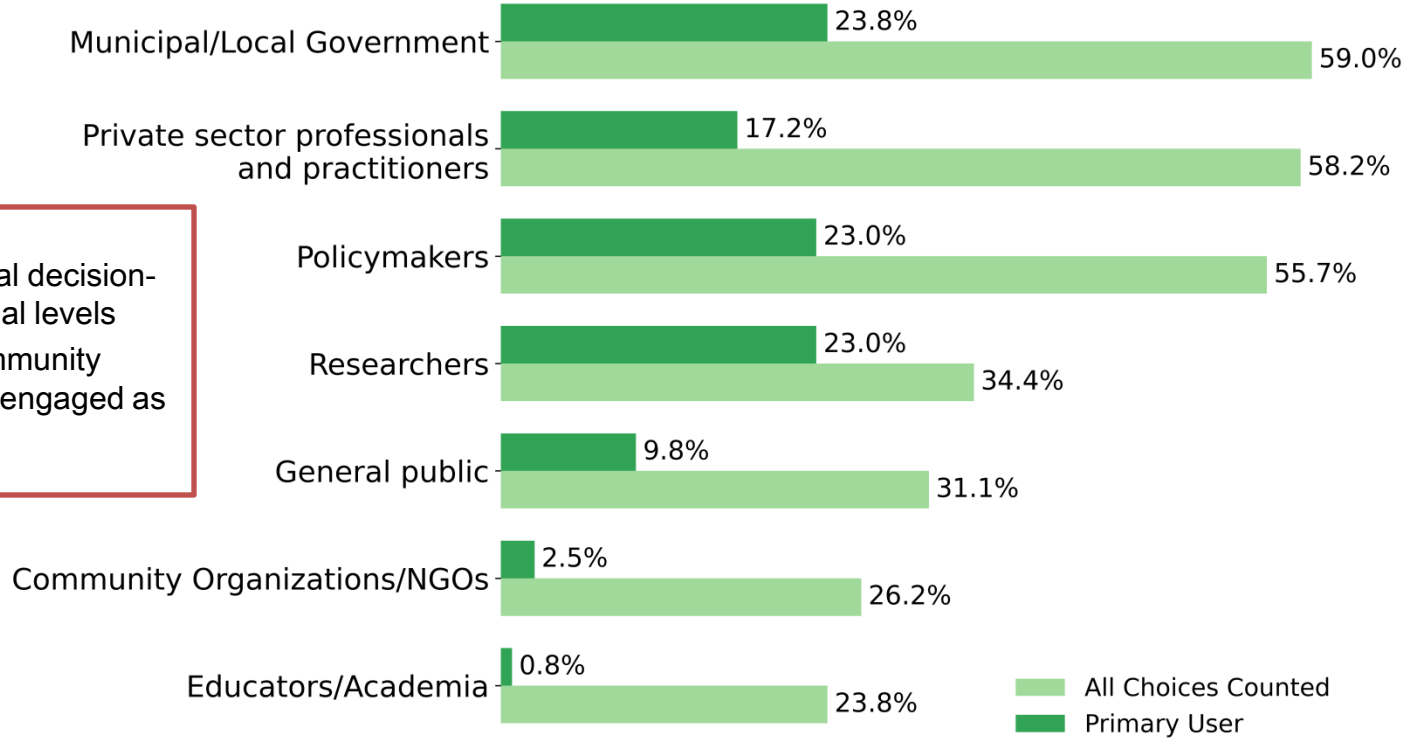
Climate adaptation in the Mediterranean

- multi-criteria analysis of 122 CCA tools

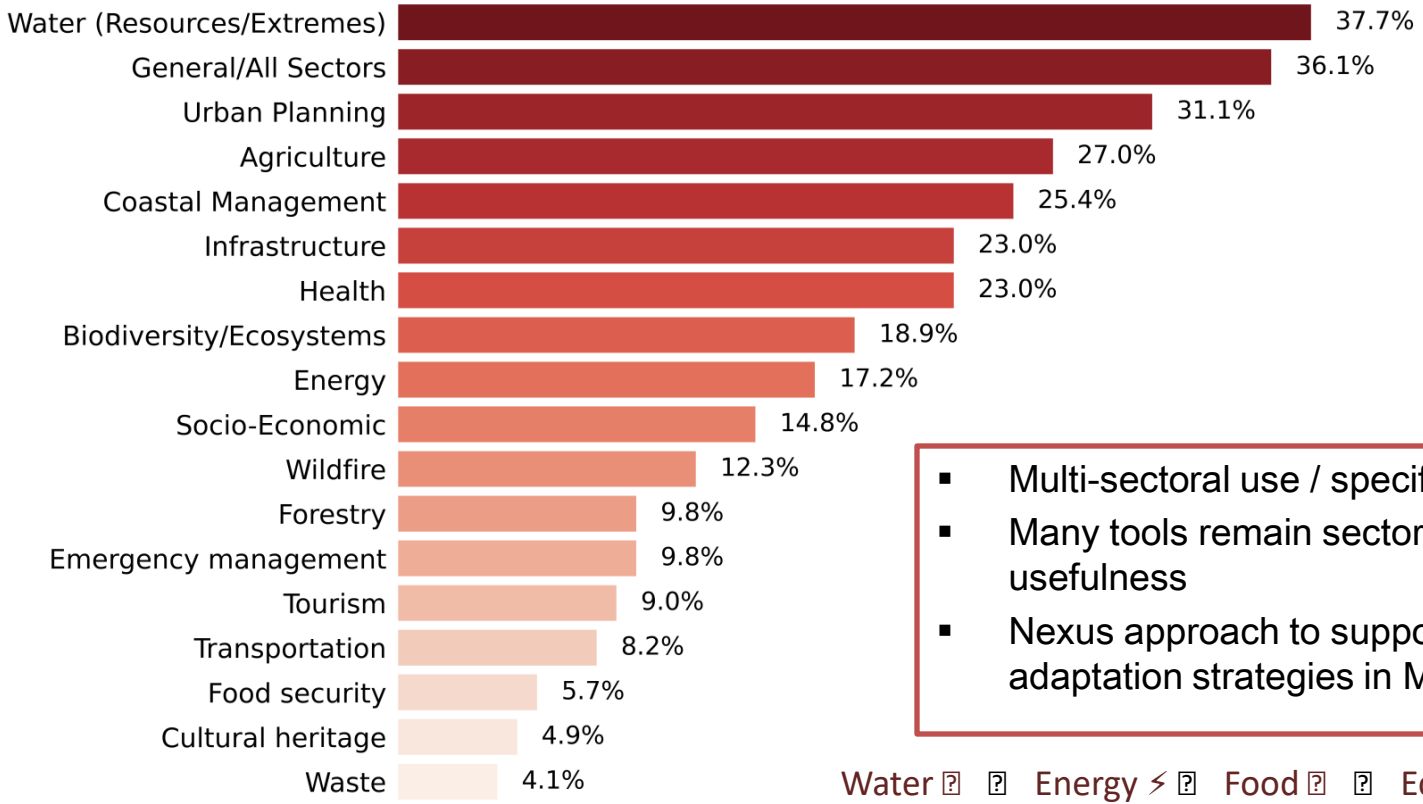
… and many more!

Results: User group

- Strong support for policy implementation and practial decision-making at local and regional levels
- Educators, academia, community organizations, NGOs less engaged as targeted users



Results: Sectoral relevance



- Multi-sectoral use / specific sectors
- Many tools remain sector-siloed, limiting their usefulness
- Nexus approach to support coordinated adaptation strategies in Mediterranean

Water Energy Food Ecosystems Tourism

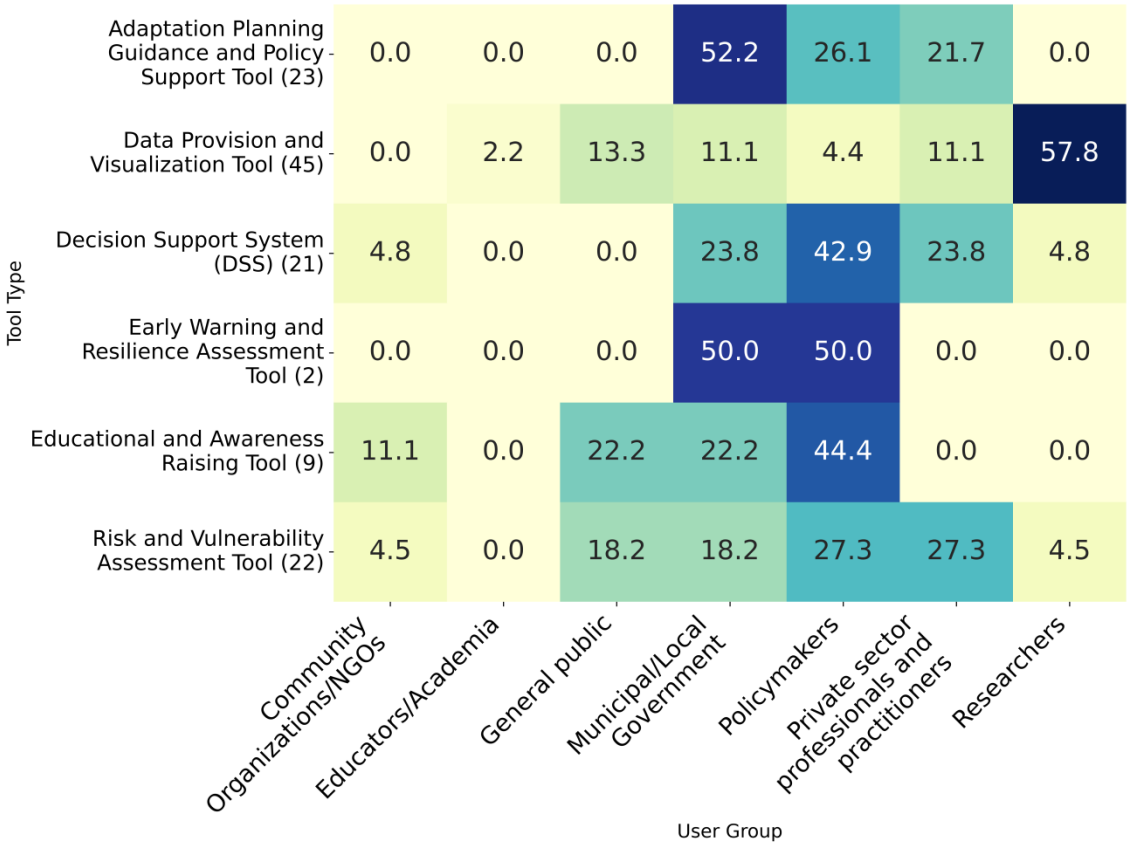
Results: Tool type

- Least represented:

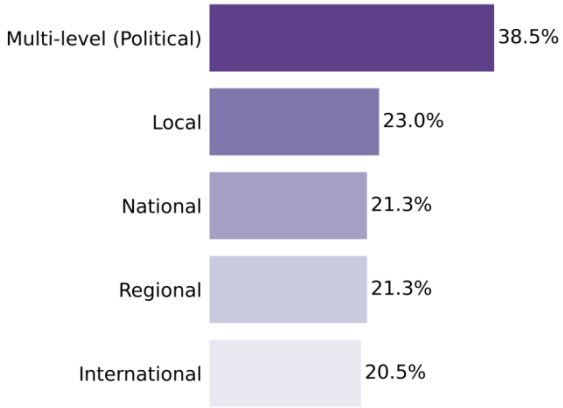
Early Warning & Resilience Tools → hazard alerts for operational use

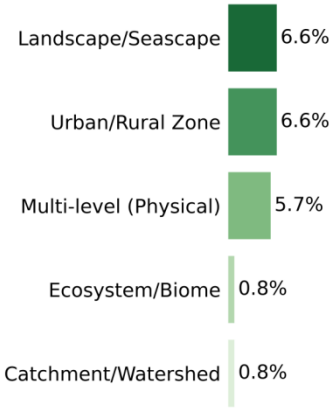
Educational & Awareness Tools → often embedded in other tools, community-focused

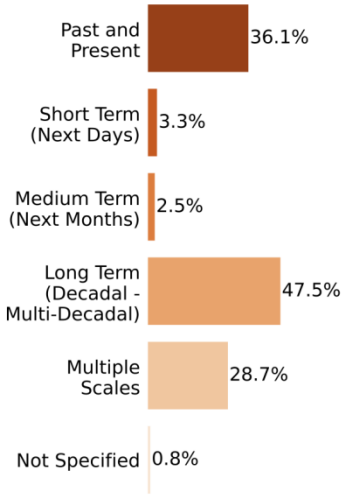
- Many tools with differential access

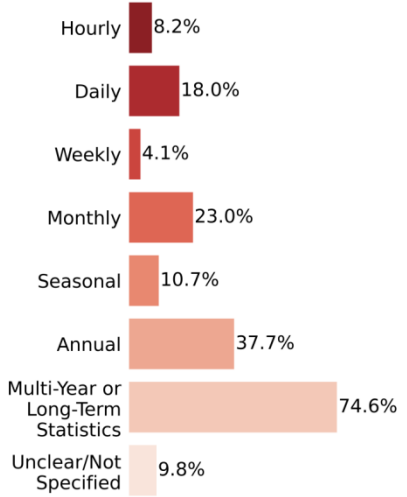


Results: Spatial and temporal scale









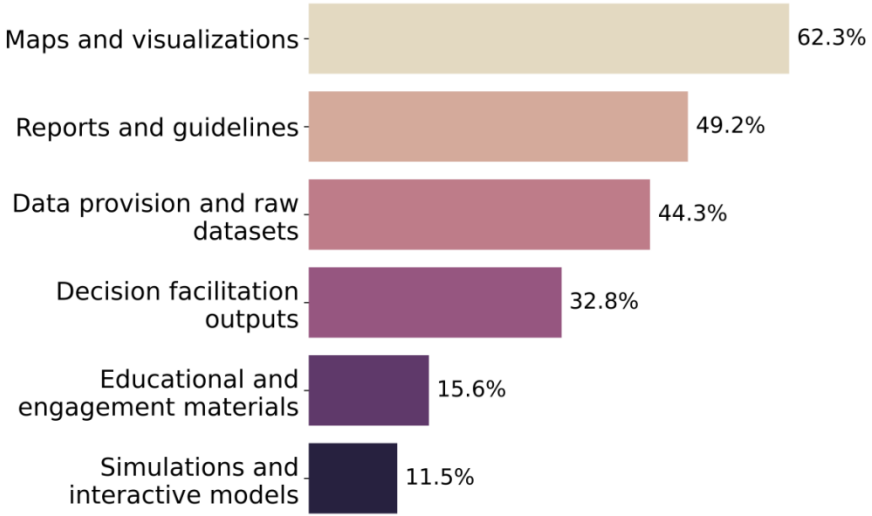
- Political boundaries dominate: tools focus on administrative units (local, national, regional)
- Missing ecological scales (river basins, ecosystems, coasts)

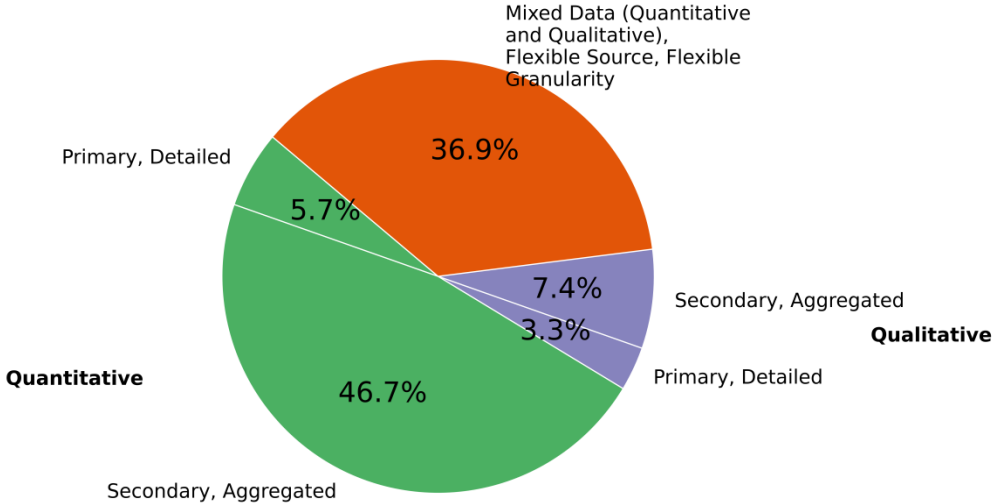
  → less effective for cross-border, nature-based challenges

- Emphasis on long-term statistics
- Useful for strategic planning.
- But insufficient for short-term operational needs (e.g., drought response, seasonal crop decisions, early warning systems)

  → limits usability for climate-sensitive sectors

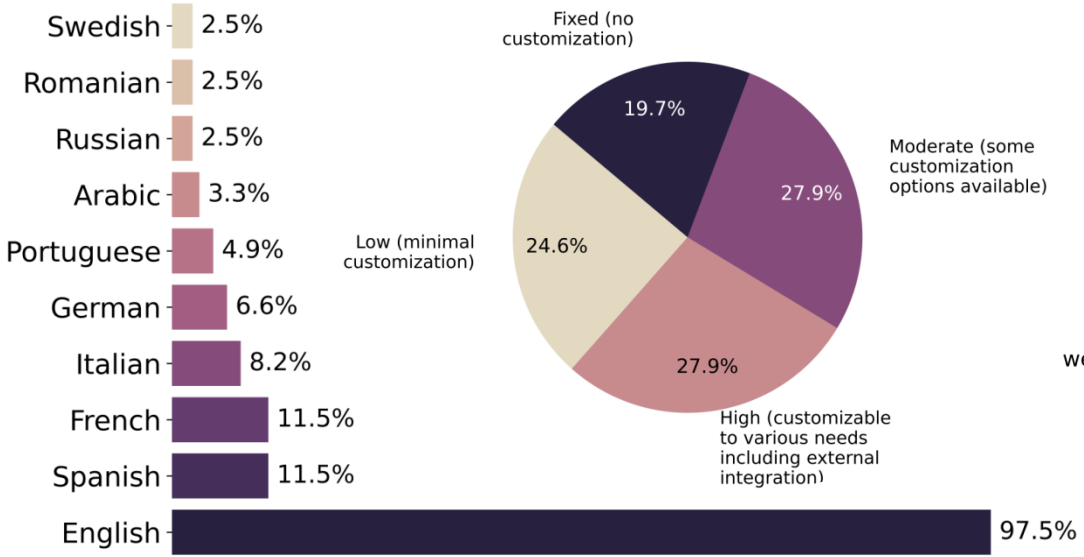
Results: Methodologies, Data utilization and Outputs

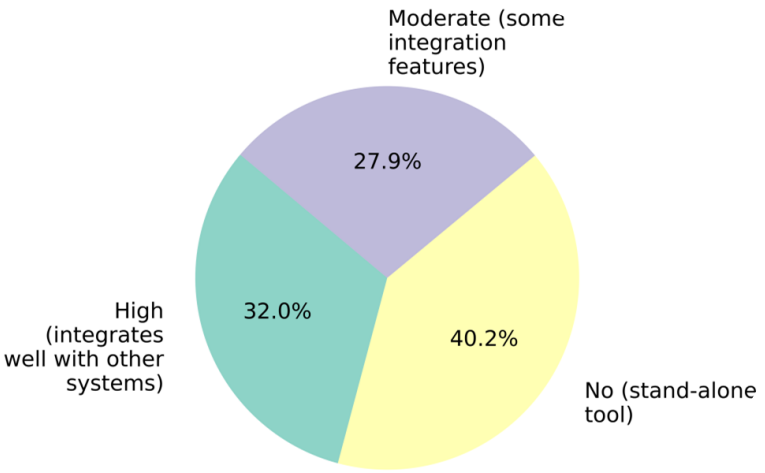




- Relying heavily on quantitative data, makes tools less accessible to non-experts
- Outputs with uniform formats → easily adaptable across sectors BUT can miss context-specific vulnerabilities in Mediterranean socio-ecological systems

Results: Customization, Integration and Usability

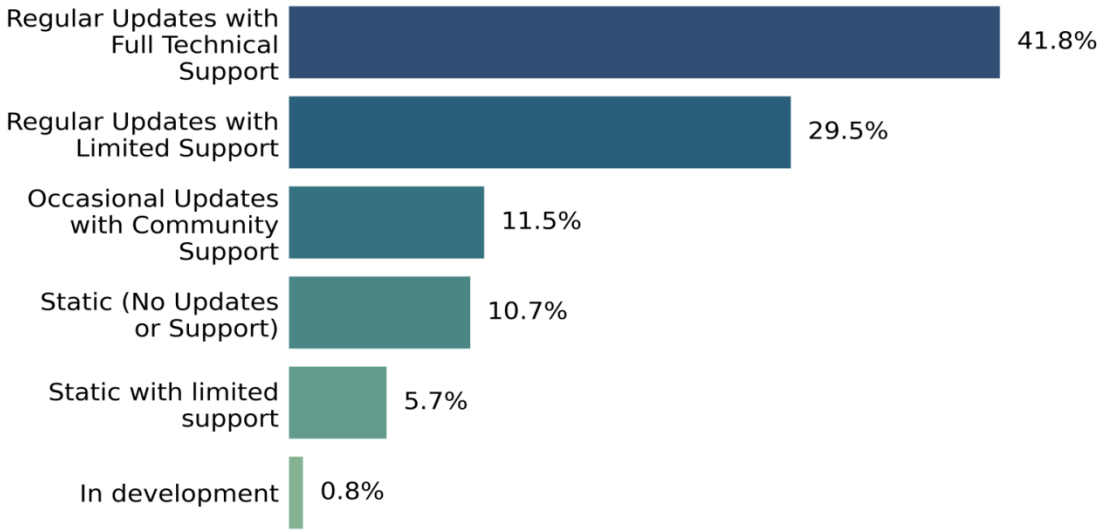


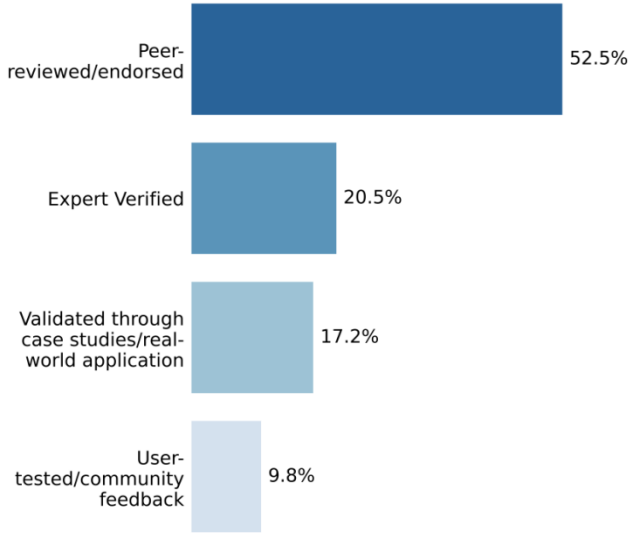


- Ease of use depends on individual user's background & expertise
- Substantial portion of tools require technical/scientific knowledge → barrier for non-experts
- Language, documentation, and stability of platforms also shape who can actually use them!
- Limited language options risks excluding Mediterranean stakeholders

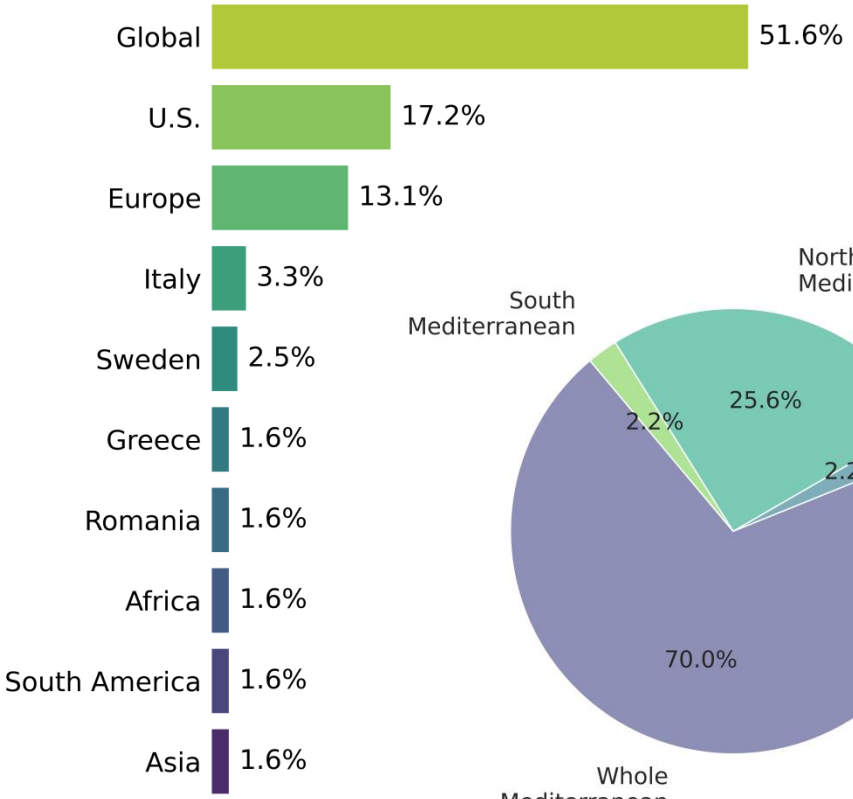
Results: Maintenance, Validation and Reliability

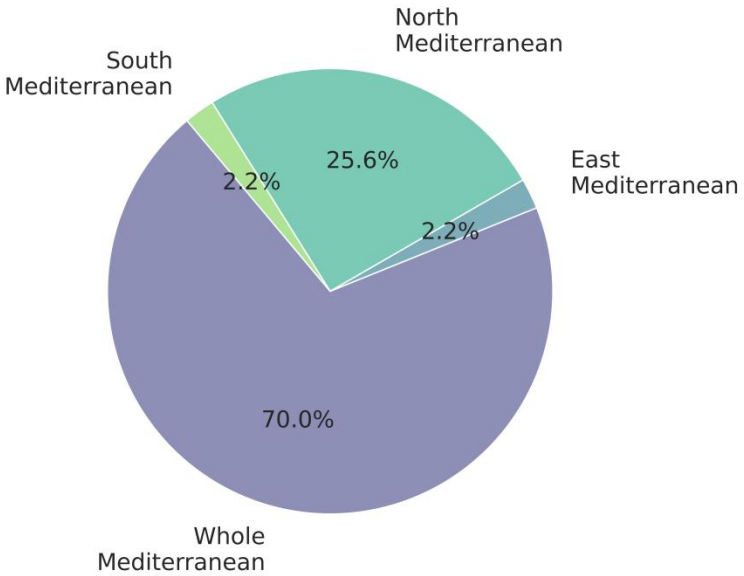
- Many tools rely on short-term project funding → Threatens long-term reliability
- Risk of tools becoming outdated just when adaptation decisions are most needed.
- Lack of real-world testing → limits usability & effectiveness.





Results: Geographical distribution





- Only a limited number of climate change adaptation tools **(12%)** were developed explicitly for Mediterranean region
- Majority of coverage is indirect: global tools applied to the Mediterranean might overlook the specific socio-economic and climatic features of its sub-regions.
- Important to integrate local knowledge with scientific data to enhance the effectiveness of adaptation strategies

Conclusions

Without inclusive, context-specific tools → risk maladaptation
With better-designed tools → support just and sustainable adaptation in Mediterranean

- Wide coverage across many sectors & adaptation themes.
- Cost is generally not a barrier → 89% free-to-use.
- Majority designed to be user-friendly for broad audiences, providing access to high-quality data, projections, and technical guidance

Only 12% explicitly Mediterranean-focused → limited contextualization despite high vulnerability

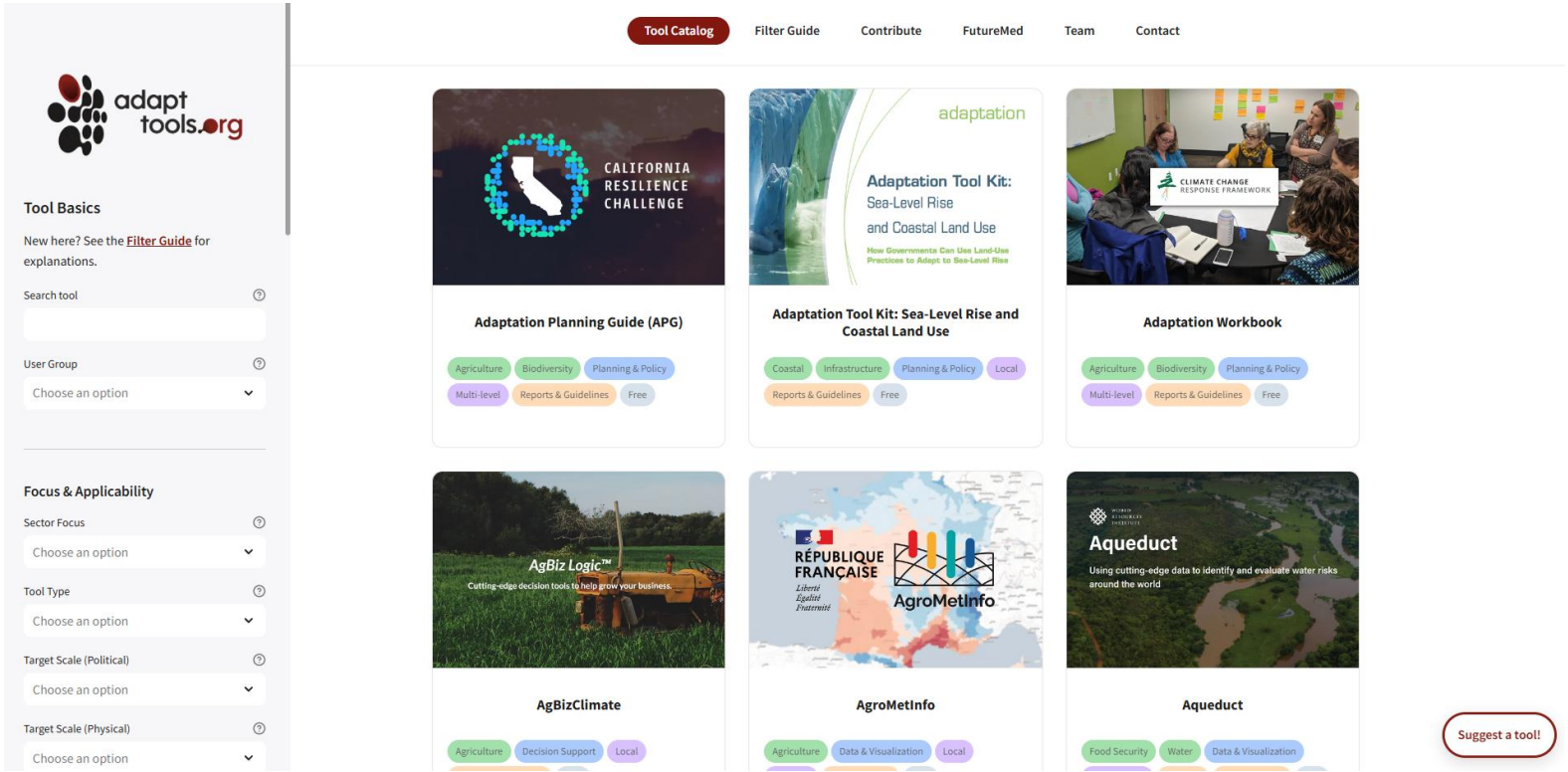
Tools emphasize global/European scope → risk of generic outputs for unique local realities

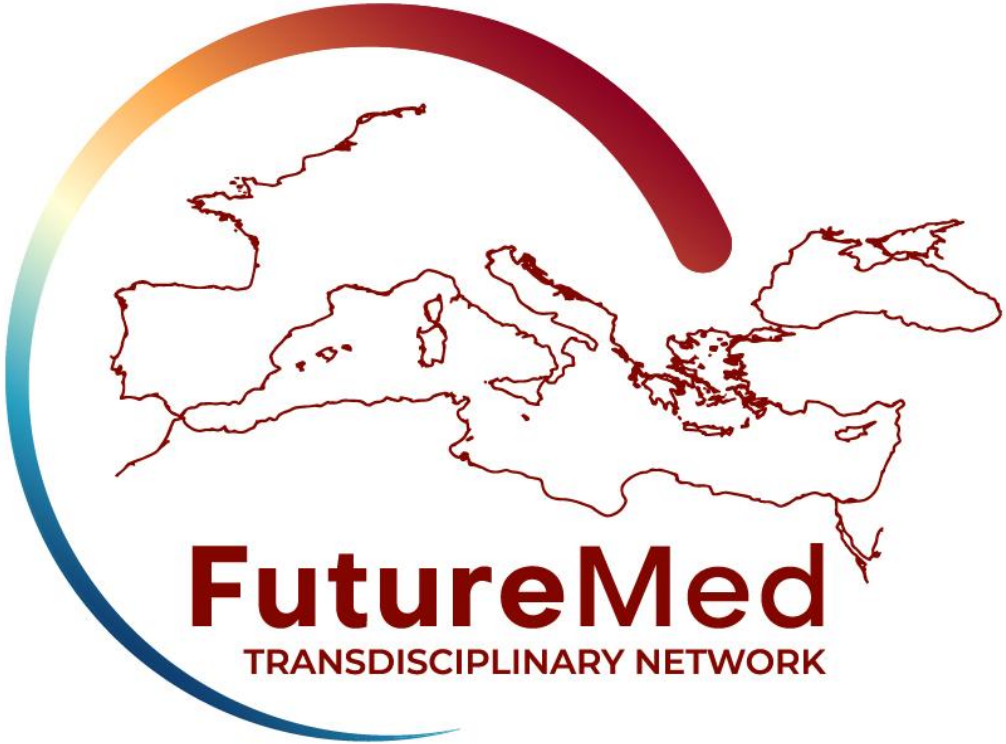
Many designed for policymakers & institutions → communities, NGOs, educators underrepresented

Focus on single hazards and overlook compound, cascading, or climate-attributed impacts → underestimates compound risks & socio-environmental complexity

Heavy reliance on project funding, uneven updates, few tools tested in real Mediterranean contexts → Long-term sustainability uncertain: heavy

Next steps: online tool database





Thank you!

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