Appendix 3. The outcomes of frame analysis regarding framing scale challenges as derived from scientific knowledge gaps. The numbers within parentheses indicate how many participants can be attributed to each code. GR refers to the participants of the focus group discussions in Greece and FIN refers to those in Finland.

Scale-related problems (Diagnosis and roles of actors)	Codes
Mismatches between conservation objectives and human action (in terms of time, space, knowledge)	There is a limited understanding of the scale-dependence of diversity components (GR: 7; FIN: 7)
	Political and economic criteria are emphasized when deciding the size of a conservation area (GR: 6; FIN: 7)
	Knowledge about nonlinear ecological processes at different scales is incomplete (GR: 5; FIN: 4)
	Limited number of long-term and large-scale experiments on the effects of biodiversity components on ecosystem functioning across spatial and temporal scales (GR: 3; FIN: 2)
	Decisions are not based on systematic conservation planning tools and software, e.g., Zonation, Marxan (GR: 3; FIN: 1)
Problems in choosing boundaries and implementing zoning plans within conservation areas	Conservation biologists should discuss and decide the ideal size (large, small) of a conservation area (GR: 5; FIN: 6)
	The impacts of climate change on species richness and/or fitness across spatial-temporal scales are not known or taken into consideration (GR: 5; FIN: 5)
	Decisions based on administrative borders do not support optimal conservation scaling (GR: 6; FIN: 4)
	There is not enough ecological data, e.g., long-term, at a suitable resolution, on the immigration and dispersal of species, available to design conservation areas (GR: 7; FIN: 2)
	The minimum spatial scale that is necessary to ensure maintenance of biodiversity and ecosystem functions is ignored (GR: 2; FIN: 3)
Underestimation of the way that scale challenges are related to justice and power	Issues of justice and power, even if they definitely exist, are not directly related to scale challenges (GR: 7; FIN: 6)
Ineffective coordination of	Gaps in designing different policies and management measures

conservation policies across different governance and/or administrative levels	at different spatial scales (GR: 7; FIN: 5)
	Limited information exchange across different governance levels (GR: 7; FIN: 2)
	Environmental administration and experts/academics do not discuss issues enough together (GR: 5; FIN: 4)
	Lack of ecological expertise in environmental administrations (GR: 7; FIN: 1)
Problems in integrating the biodiversity dimension into other policies across different governance and/or administrative levels	Absence of scientifically based policy instruments ensuring regional connectivity (GR: 7; FIN: 6)
	Current environmental challenges, such as climate change and biodiversity loss, have not been taken seriously in other policy sectors (GR: 5; FIN: 6)
	Environmental administrations are not influential enough over other administrative sectors for increasing the extent of protected areas (GR: 5; FIN: 5)
	Policy integration is being approached as an organizational issue whereas it is primarily a knowledge issue (GR: 3; FIN: 7)
	Policy integration is ineffective because of the absence of experts of all relevant disciplines (GR: 4; FIN: 5)
Solutions to identified problems (Prognosis and roles of actors)	
Resolving mismatches between conservation objectives and human action (in terms of time, space, knowledge)	Policies prioritized in line with ecological (expert) knowledge (GR: 7; FIN: 8)
	More "scale-sensitive" ecological data and knowledge, e.g., through more fieldwork and more systematic data sets at several scales (GR: 6; FIN: 5)
	More dynamic understanding of ecosystems functions for dealing with environmental change (GR: 3; FIN: 8)
	Support for standardized, rigorous, and objective scale-relevant methods and procedures for site selection and designation (GR: 5; FIN: 6)
	Effective communication between local conservation actions

	and planning at various administrative levels (GR: 4; FIN: 6)
How to choose boundaries and implement zoning plans within conservation areas	Defining optimal zoning within protected areas through scientifically sound approaches (GR: 7; FIN: 5)
	Systematic use of geographic information systems (GIS) for mapping species and habitats distribution (GR: 6; FIN: 4)
	Regulate harmful human impacts on biodiversity through zoning plans (GR: 5; FIN: 3)
	The size of the protected area should be related to its ecological significance (GR: 4; FIN: 3)
	Strict measures and definition of no-entry zones at the core of protected areas with rich biodiversity (GR: 5; FIN: 2)
Acknowledgment of the way that scale challenges are related to justice and power	Environmental administrations that are rationalized and base their decisions on scientific reasoning should be strengthened (GR: 7; FIN: 7)
	Better information provision about the ecological aspect of conservation to local people and/or stakeholders (GR: 7; FIN: 7)
Effective coordination of conservation policies across different governance and/or administrative levels	Effective communication of scientific knowledge between experts and administrations (GR: 7; FIN: 8)
	Environmental education programs at all levels to sensitize citizens to the benefits of biodiversity conservation (GR: 7; FIN: 7)
	The main responsibility should lie with a central coordination scheme that will have a scientifically sound biodiversity strategy (GR: 4; FIN: 5)
	Appreciation of international conservation efforts such as Natura 2000 that enforce actions at national level (GR: 3; FIN: 5)
	The choice of the ideal responsible institution for conserving biodiversity should be based on its expertise (GR: 3; FIN: 4)
Integration of the biodiversity dimension into other policies across different sectors, governance	More systematic use of land use and conservation planning tools (GR: 7; FIN: 8)
	Integration of the dimension of biodiversity conservation into all levels of environmental legislation according to a general

and/or administrative levels	strategy based on formal environmental studies (GR: 7; FIN: 6)
	Designing new conservation areas and ensuring connectivity between areas in accordance with the principles of conservation biology (GR: 7; FIN: 6)
	Larger spatial scales should be taken into consideration to improve connectivity between seminatural habitats, in river basins, forest sites, etc. (GR: 5; FIN: 6)
	Interdisciplinary approaches during policy implementation and dominance of natural sciences during policy designation (GR: 6; FIN: 4)