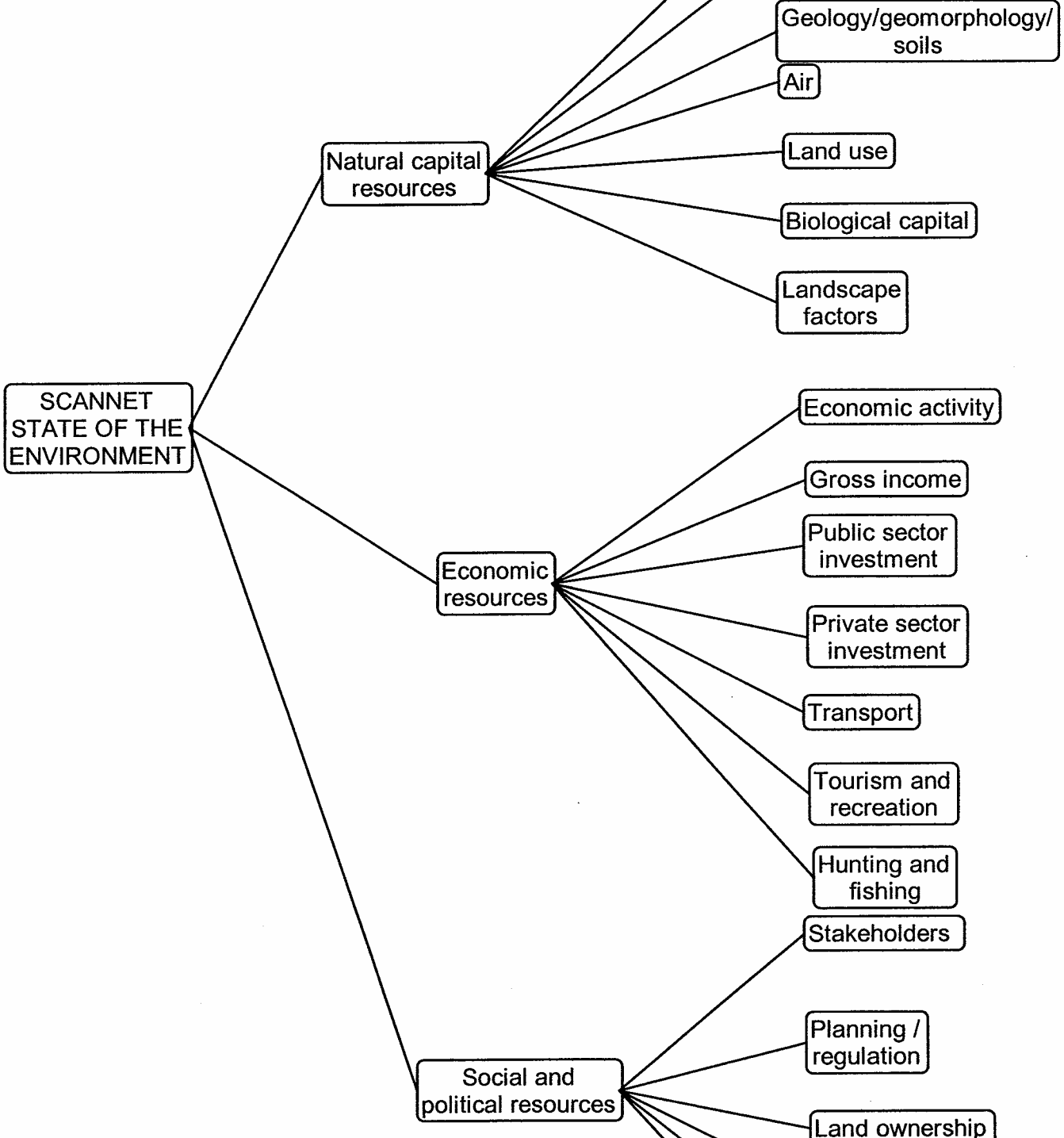
Natural Heritage Monitoring: Deciding priorities

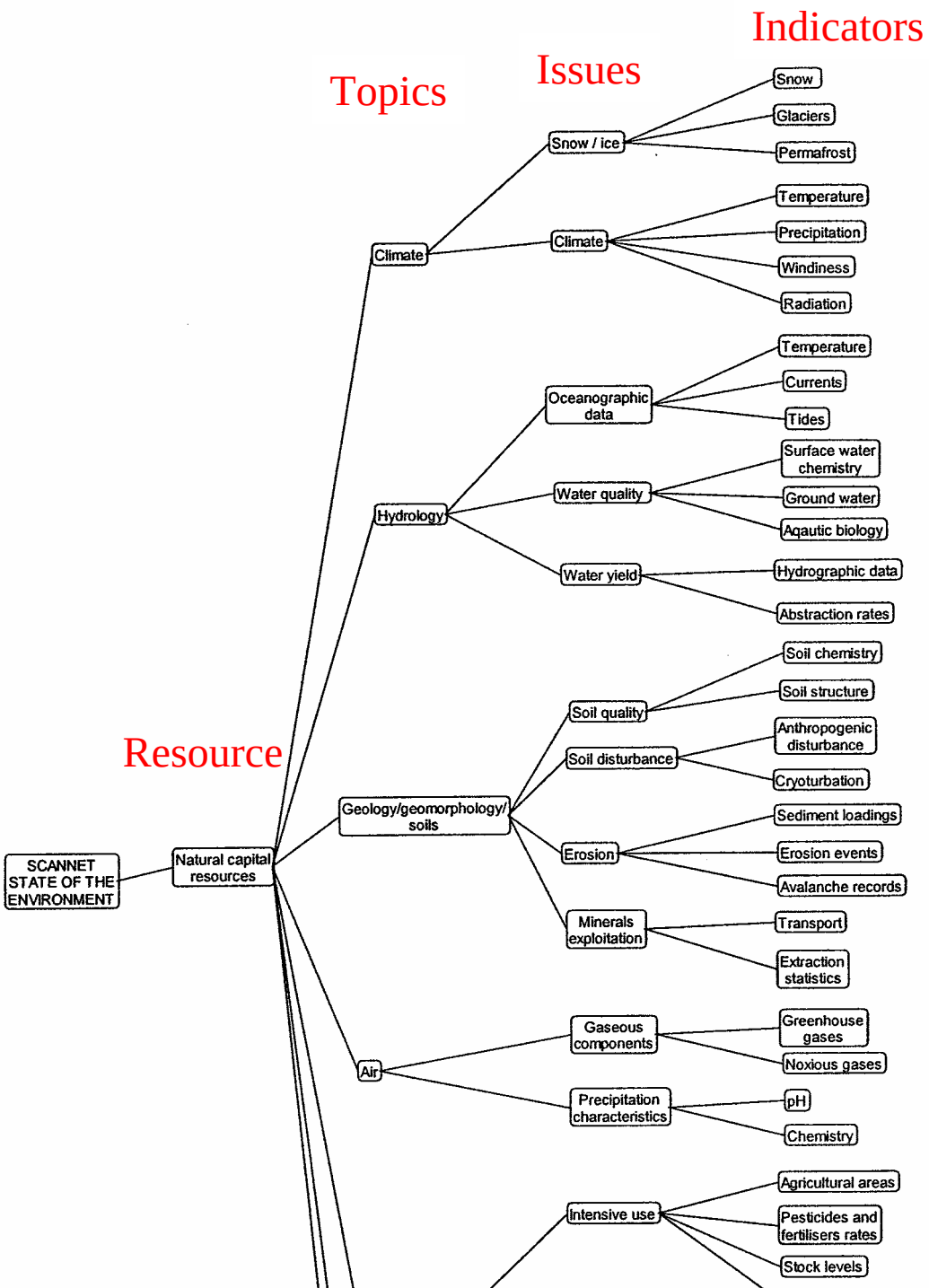
Aims and questions

- What types of generic data should be considered
- Who should decide
- Can we prioritise indicator variables
- Can we produce an audit trail for a rational framework of environmental monitoring at different functional scales

DECISION MODELLING APPROACH

- Identify a broad potential range of topics issues and indicators
- Are there any important ones missing
- Get stakeholders to rank importance
- Get discussion of results and re-scoring


SCANNET STATE OF THE ENVIRONMENT
Natural capital resources
Geology/geomorphology/ soils
Air
Land use
Biological capital
Landscape factors
Economic resources
Economic activity
Gross income
Public sector investment
Private sector investment
Transport
Tourism and recreation
Hunting and fishing
Social and political resources
Stakeholders
Planning / regulation
Land ownership


Indicators
Issues
Topics
Resource
SCANNET STATE OF THE ENVIRONMENT
Natural capital resources
Climate
Snow / ice
Snow
Glaciers
Permafrost
Climate
Temperature
Precipitation
Windiness
Radiation
Hydrology
Oceanographic data
Temperature
Currents
Tides
Water quality
Surface water chemistry
Ground water
Aqautic biology
Water yield
Hydrographic data
Abstraction rates
Geology/geomorphology/ soils
Soil quality
Soil chemistry
Soil structure
Soil disturbance
Anthropogenic disturbance
Cryoturbation
Erosion
Sediment loadings
Erosion events
Avalanche records
Minerals exploitation
Transport
Extraction statistics
Air
Gaseous components
Greenhouse gases
Noxious gases
Precipitation characteristics
pH
Chemistry
Intensive use
Agricultural areas
Pesticides and fertilisers rates
Stock levels

INSTRUCTIONS TO PARTICIPANTS

Step 1	Step 2	Step 3	Step 4
Ranking Resource Types	Ranking Topics	Ranking Issues	Ranking Indicators

100% is most important,

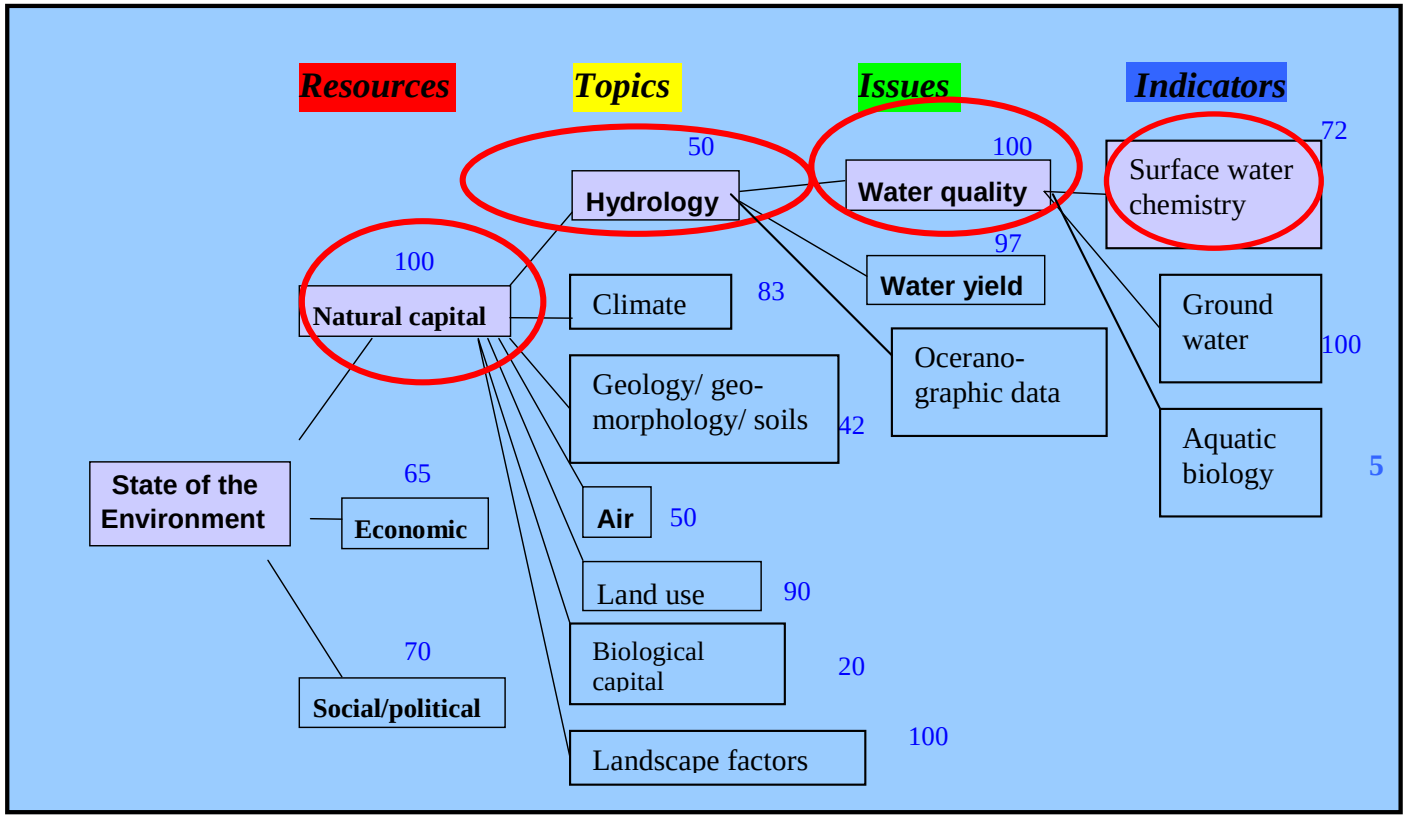
75% fairly important,

50% intermediate,

25% fairly unimportant and

0% is of no importance.

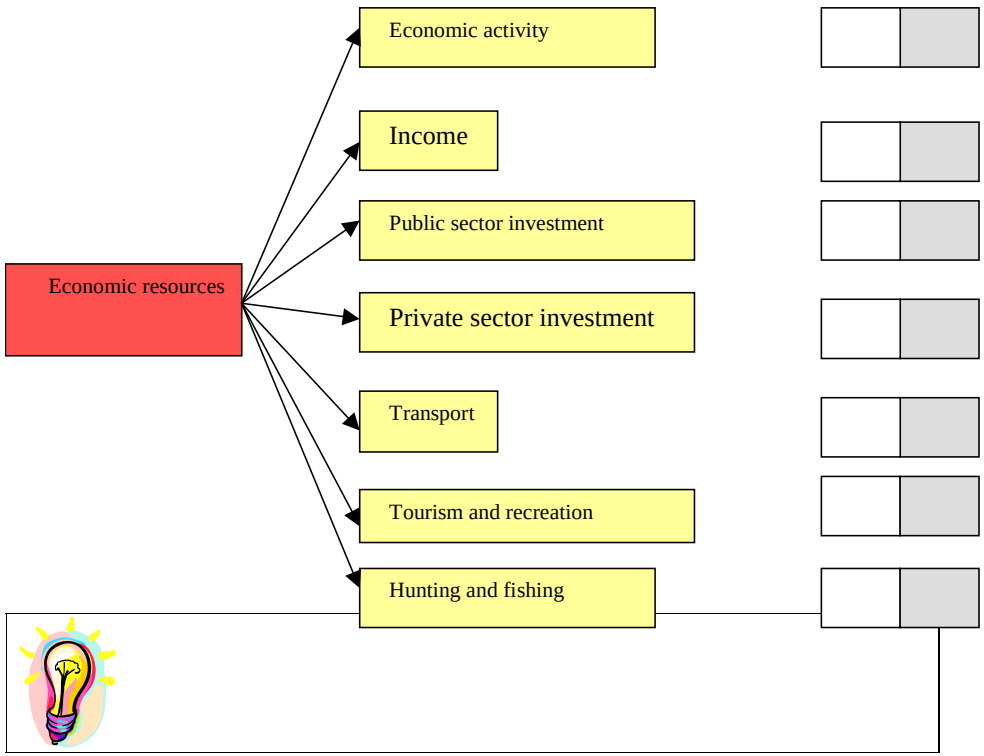
Comments box (optional)



Part of the decision tree, showing scoring from resources (Step1) to indicators (step4)
Weighted criteria scores example for
Surface water chemistry = indicator score x issue weighting x topic weighting x resource weighting
Surface water chemistry =72 x 1.0 x 0.5 x 1.0 =36

2B. Rank the importance of economic **topics** in relation to possible changes over the next 20 years

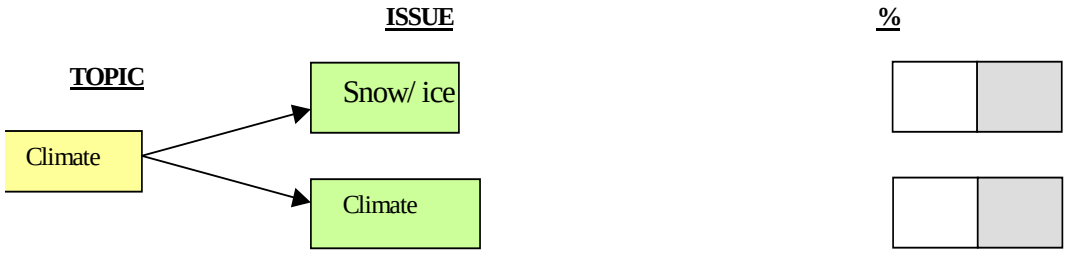
Economic activity: Production and turnover by economic sectors
(**primary**: related to harvesting of resources such as forests,
secondary: processing and manufacturing,
tertiary: services)
Income: Per capita income by sector
Public sector investment: Local regional or EU government subsidies and investment
Private sector investment: All non-government investment
Transport: Traffic flows of walkers, rail and road vehicles, and public transport
Tourism and recreation: Use of areas for tourist visits and participation in recreational activities
Hunting and fishing: Hunting birds and mammals, and fishing



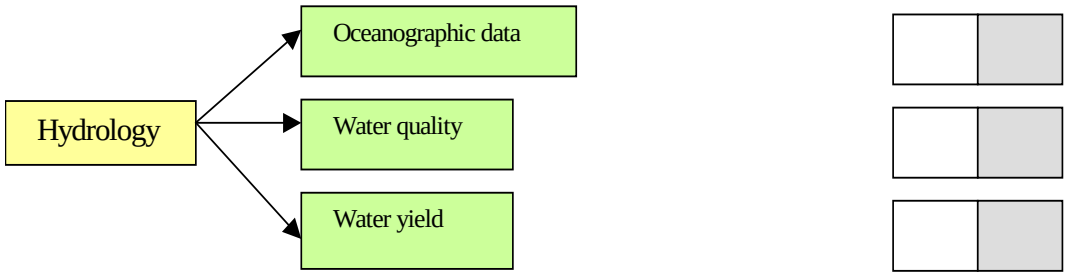
Step 3 Ranking ISSUES

3A. Rank the importance of natural capital **issues** in relation to possible changes over the next 20 years

Snow/ ice: includes snow cover, depth and persistance, permafrost and glacier dynamics
Climate: Meteorological characteristics and the changes over time in key features such as temperature, wind speed and precipitation



Oceanographic data: includes water temperature, currents, tides etc. (mainly Faroe Islands, Iceland, Svalbard)
Water quality: The chemical and biological quality of water resources
Water yield: Water flow characteristics of rivers, streams and catchments

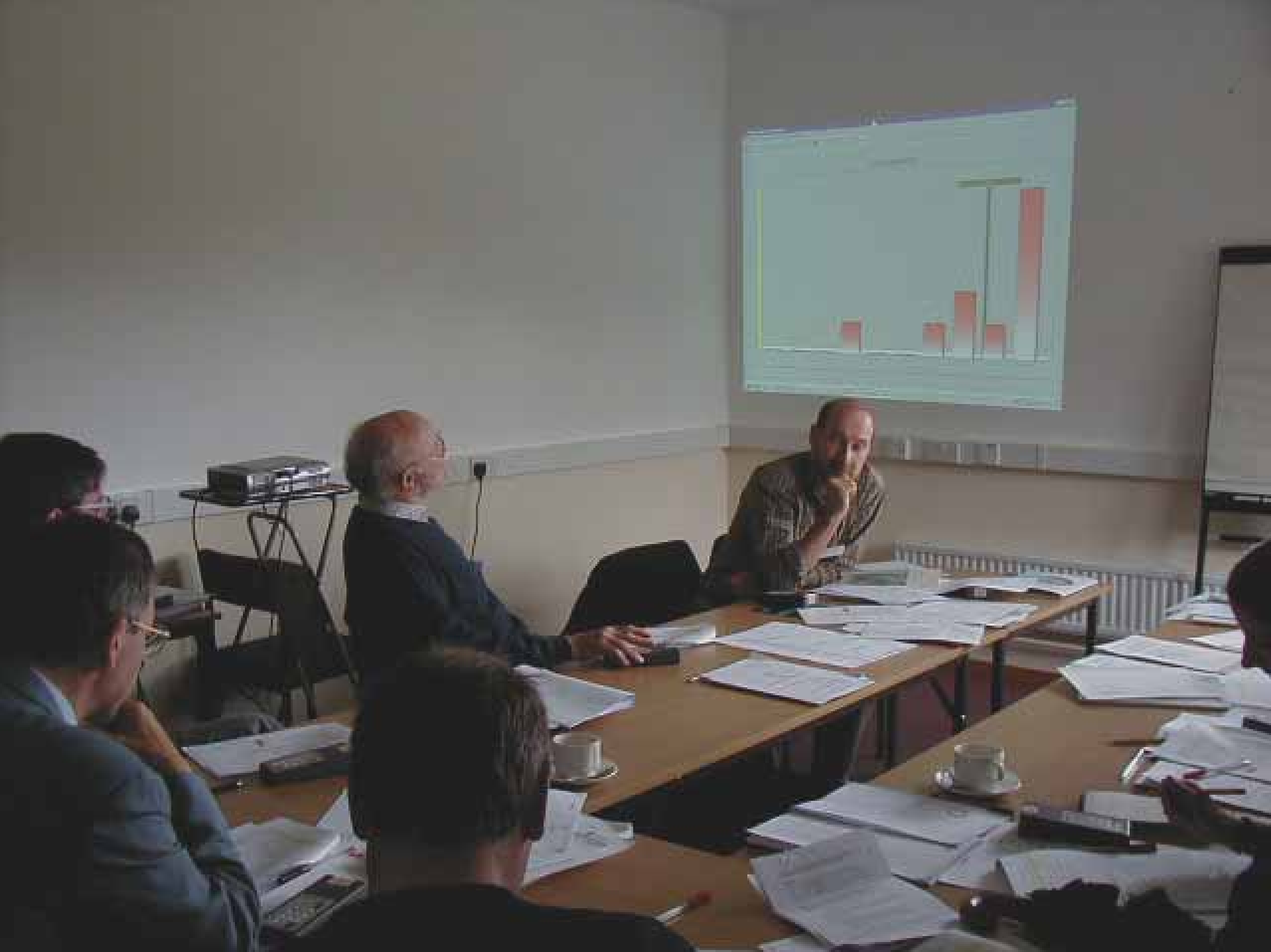


INSTRUCTIONS TO PARTICIPANTS

Fill in the score box:

Score (0-100%) → [ ][ ] ← Revised score(0-100%)

Percentage	Keypad	Comments
91-100 %	10	100% is most important
81-90 %	9	
71-80 %	8	75% fairly important
61-70 %	7	
51-60 %	6	50% intermediate
41-50 %	5	
31-40 %	4	
21-30 %	3	25% fairly unimportant
11-20 %	2	
0-10 %	1	0% is unimportant



Resources

Participant	MD	GB	EB	IP	MR	AG	DJ	NP	MF	MN	Mean	St.Dev.
Natural Capital	100	100	100	100	50	100	100	100	100	100	95	16
Economic factors	70	80	60	100	75	80	95	80	100	60	80	15
Social and political	80	90	75	100	100	80	95	60	100	75	86	14

Topics

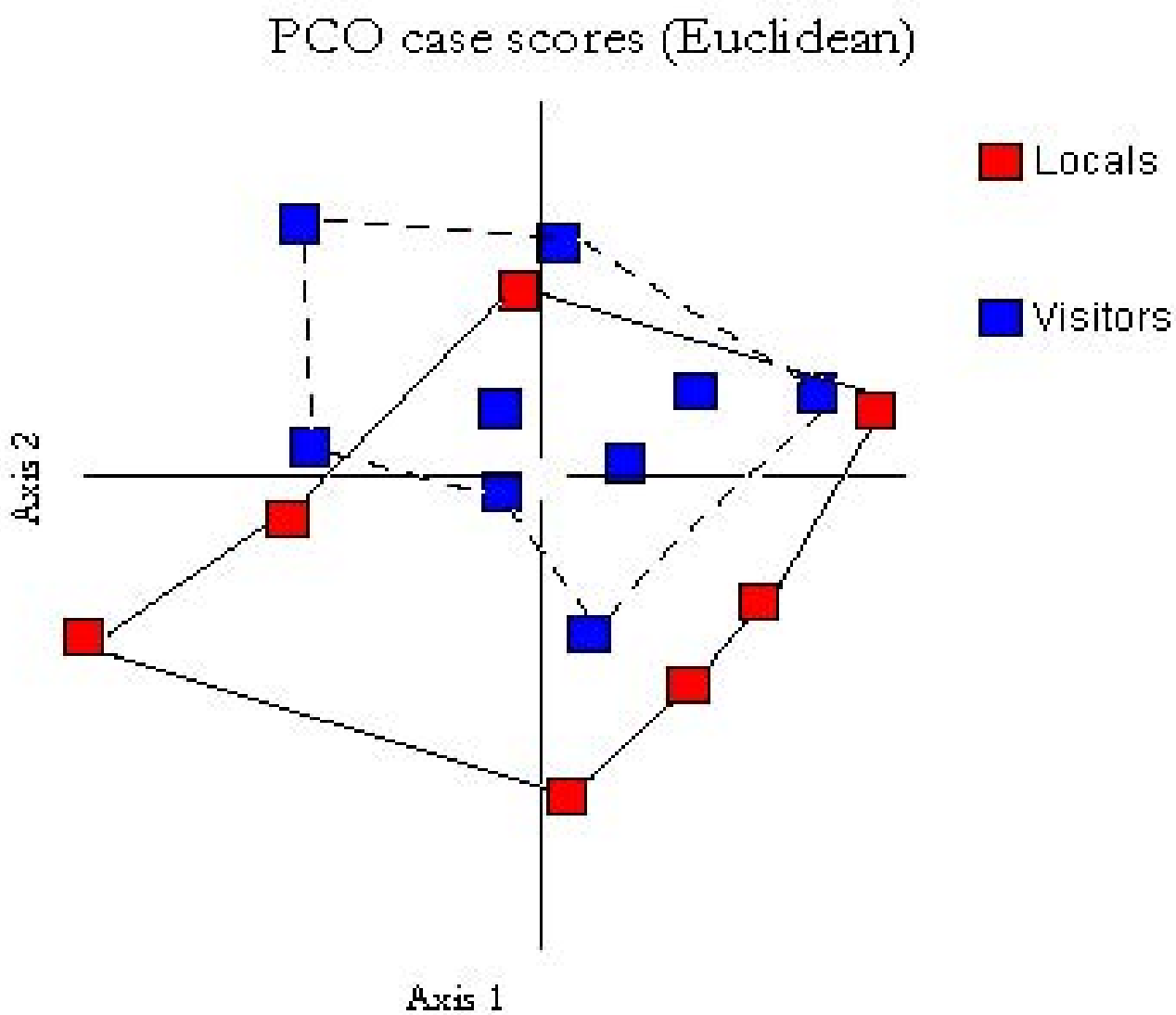
Topics	Mean	St.Dev.
Climate	81	20
Land use	81	20
Biological resources	80	25
Hydrology	69	19
Landscape	56	30
Tourism and recreation	72	18
Economic activity	71	19
Public sector investment	69	22
Private sector investment	66	20
Transport	56	14
Hunting and fishing	55	16
Planning / regulation	78	17
Stakeholders views	75	20
Demography	63	9
Cultural heritage	56	19

Issues

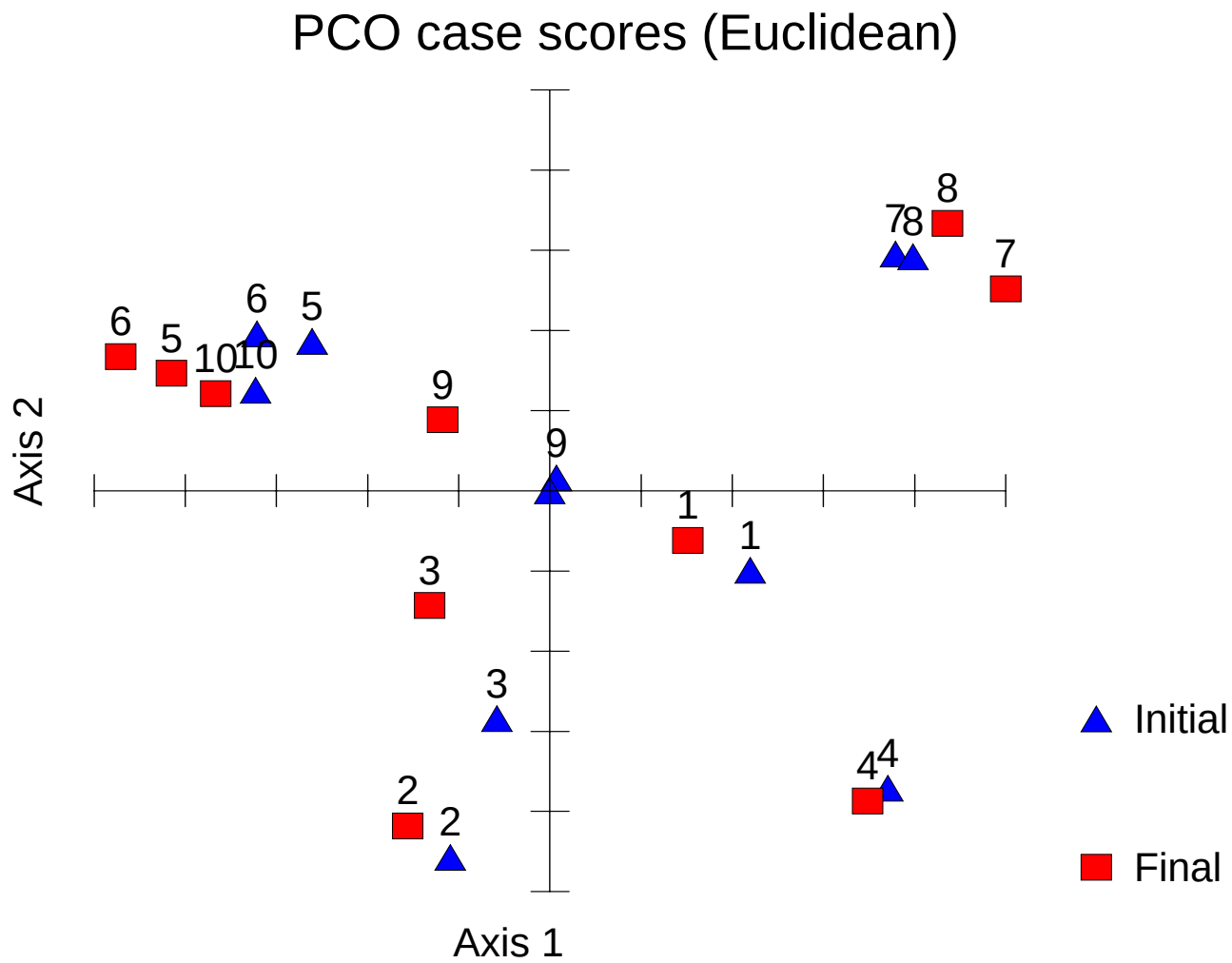
Issues	Mean	St.Dev.
Climate	79	19
Extensive uses	77	24
Biodiversity inventories	76	26
Status/condition	75	29
Forests	67	25
Water quality	59	27
Water yield	58	16
Intensive uses	57	20
Snow & ice	56	28
Landscape fabric	55	31
Production/ tirnover by sector	67	22
Capital expenditure	66	20
Agri-environment subsidies	65	25
Participants in key activities	64	20
Other grants and assistance	63	26
Visitors to key attractions	61	15
Traffic flows	56	14
Changing stocks	55	16
Tourism infrastructure	54	21
Employment data	53	17
Regulation of environmental quality	78	17
Numbers of stakeholders	75	20
Planning controls	69	22
Age structure	57	15
Population density	53	13
Impacts on heritage	53	21

Indicators

Indicators	Mean	St.Dev.
Precipitation	74	20
Habitat condition	73	31
Key species status	71	32
Temperature	70	21
Hunting and fishing areas	70	28
Rangeland areas	69	30
Plant communities	69	29
Habitats	67	26
Multi-use forest	63	22
Animal populations	63	30
Windiness	63	23
Conservation areas	60	35
Aquatic biology	58	27
Snow	56	28
Landscape fabric	55	31
Hydrographic data	55	19
Runoff/groundwater chemis	53	25
Stock levels	52	22
Agri-env. Impacts	65	25
Primary sector	65	25
Activity uptake	63	21
Visitor numbers	59	17
Tertiary sector	56	25
Mammal & bird stocks	54	16
Traffic flows	54	15
Occupancy rates	52	19
Uptake by sector	51	23
Regional budget by area	51	30
Use of patths	51	20
Fish stocks	51	15
Employment	50	19
Planning applications	50	29
Compliance data	78	17
Planning control results	69	22
Surveys of views	65	32
Population structure	57	15
Spatial distribution	52	14
Membership lists	50	23



Faroes November 2001



Principal coordinates ordination (PCO) for the scores of individuals before (blue triangles) and after (red squares) discussion.
Faroes 03/07/02

Cairngorms

Indicators	Mean	St.Dev.
Compliance data	78	17
Precipitation	74	20
Habitat condition	73	31
Key species status	71	32
Temperature	70	21
Hunting and fishing areas	70	28
Planning control results	69	22
Rangeland areas	69	30
Plant communities	69	29
Habitats	67	26
Surveys of views	65	32
Agri-env. Impacts	65	25
Primary sector	65	25
Multi-use forest	63	22
Animal populations	63	30
Activity uptake	63	21
Windiness	63	23
Conservation areas	60	35
Visitor numbers	59	17
Aquatic biology	58	27
Population structure	57	15
Snow	56	28
Tertiary sector	56	25
Landscape fabric	55	31
Hydrographic data	55	19
Mammal & bird stocks	54	16
Traffic flows	54	15
Runoff/groundwater chemistry	53	25
Stock levels	52	22
Occupancy rates	52	19
Spatial distribution	52	14
Uptake by sector	51	23
Regional budget by area	51	30
Use of patths	51	20
Fish stocks	51	15
Membership lists	50	23
Employment	50	19
Planning applications	50	29

Faroes

	Mean	St. Dev.
Approved applications	74	29
Temperature (oceanographic data)	74	31
Temperature (climate)	71	30
Currents	68	35
Compliance data	67	24
Fish stocks	66	30
Types of application	66	24
Animal populations	63	32
Fish catches	62	31
Primary sector	61	28
Plant communities	59	31
Windiness	56	25
Surface water chemistry	56	31
Secondary sector	55	32
Precipitation	54	27
Exceedance data	53	19
Hunting and fishing areas	53	32
Artifacts	53	27
Habitat condition	53	23
Impacts	52	35
Habitats	52	29
Aquatic biology	50	28