How to prioritize climate change adaptation measures?

Yeora Chae

한국환경정책·평가연구원 국가기후변화적응센터 KACCC

Contents

I . Introduction

1. Research needs

- Even if stringent global GHG emissions reductions prove to be successful, further climate change seems to be inevitable (IPCC 2007)
- Climate change impacts will be unevenly distributed and put additional pressure on social-ecological functions and structures.
- Policy makers at national and local levels have begun to initiated dedicated adaptation practices to counter adverse impacts.
- Formal planning for climate change adaptation is emerging rapidly
- To maximize the benefit of adaptation, prioritizing adaptation options are essential

2. Research tasks

- To investigate adaptation measures and plan
- To categorizes adaptation options
- To analyze methodologies for evaluating adaptation options
- Multi-criteria analysis, cost-benefit analysis, etc.
- To develop a methodology for prioritizing adaptation options

Ⅱ. Climate change adaptation

1. Objective of adaptation: What is successful adaptation?

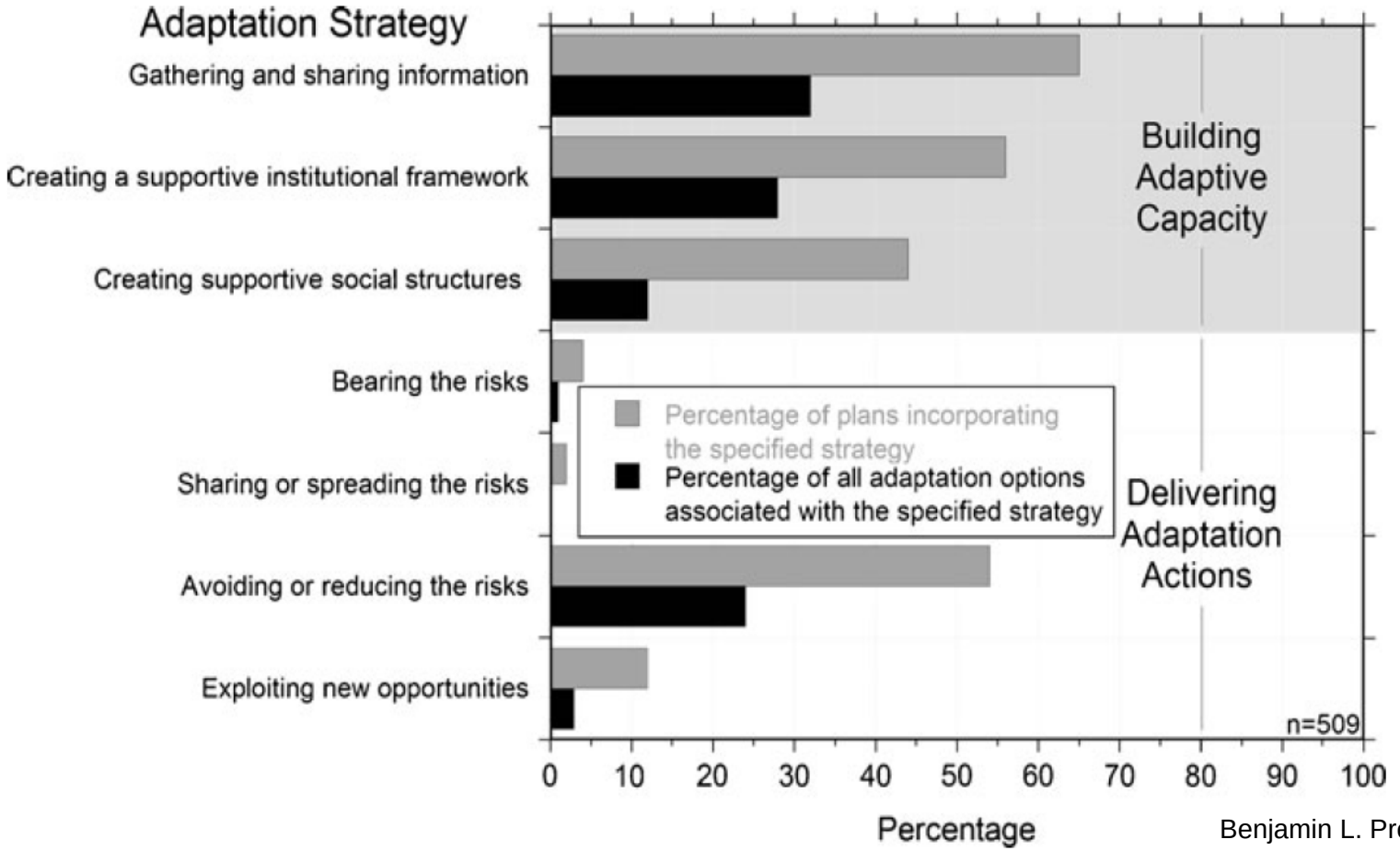
- To maintain climate-related risks at present level
- To reduce risks from present level if current risks are unacceptable
- To minimize exposure of most vulnerable population

- cost effectiveness
- equity: distribution of benefit
- sustainability

2. Classification adaptation strategies

Strategy	Example
Building Adaptive Capacity	
Gathering and sharing information	Undertaking research; collecting and monitoring data; and raising awareness through education and training initiatives
Creating a supportive institutional framework	Changing standards, legislation, and best practice guidance; and developing appropriate policies, plans and strategies
Creating supportive social structures	Changing internal organizational systems; developing personnel or other resources to deliver the adaptation actions; and working in partnership.
Delivering Adaptation Actions	
Bearing the risks	Manage retreat from sea-level rise and/or flooding
Sharing or spreading the risks	Insurance and/or hedging against uncertainty
Avoiding or reducing the risks	Upgrade of existing infrastructure; installation of new infrastructure; changing the timing and/or location of activities and enterprises; bolstering emergency and disaster management responses
Exploiting new opportunities	Adjust behavior to take advantage of changing climatic conditions; deploy a new technology and/or practice; engage in a new activity or enterprise

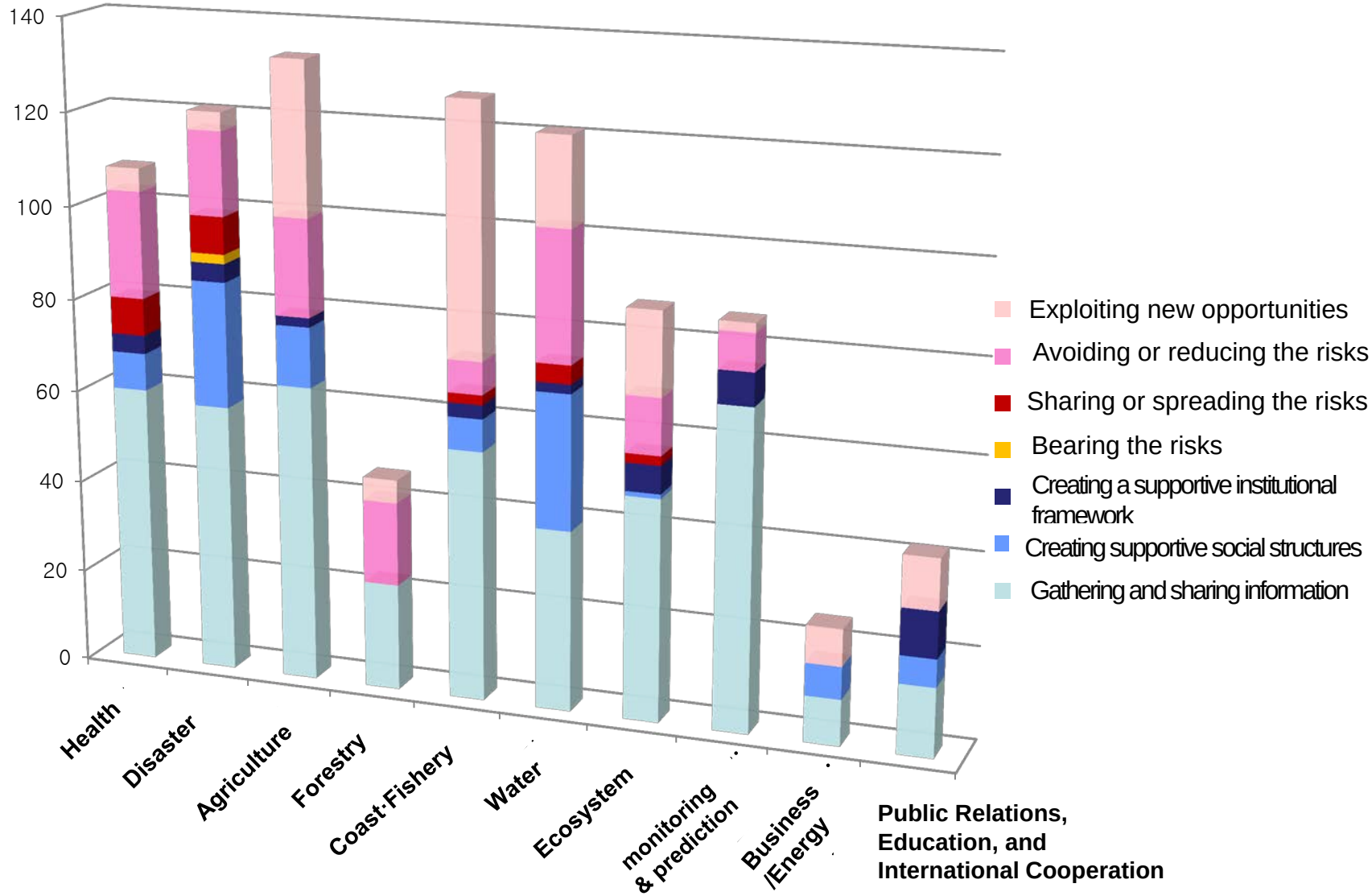
3. The percentage of adaptation strategies



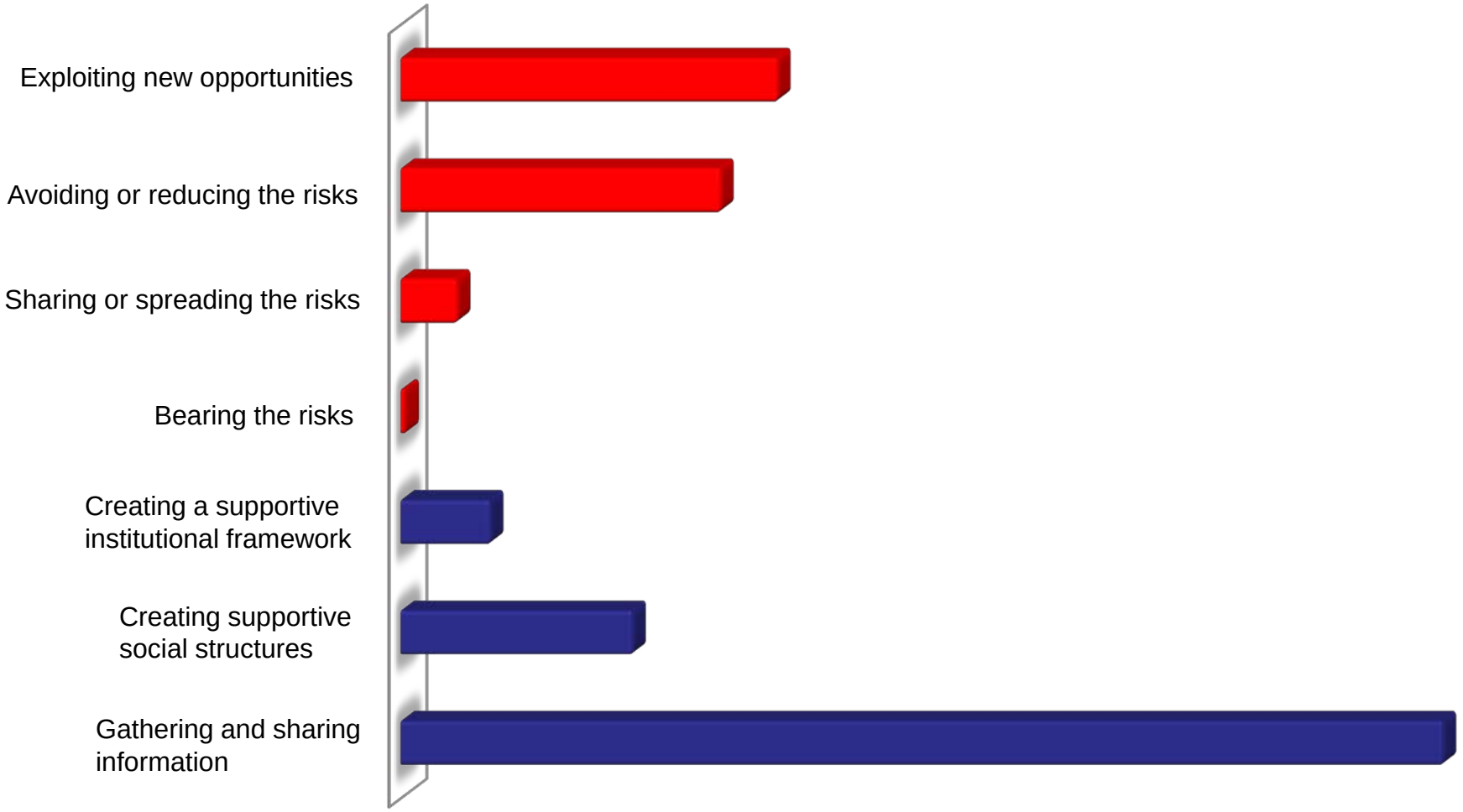
Benjamin L. Preston(2011)

The ‘percentage of plans incorporating the specified strategy’ represents the proportion of the 57 adaptation plans that had at least one adaptation option consistent with a given adaptation strategy (UKCIP 2008).

4. The Current Situation of Korea adaptation strategies (group)



5. The Current Situation of Korea adaptation strategies (type)



Ⅲ. Prioritizing adaptation options

1. The process of evaluation in adaptation

1) Identification of core stages in adaptation planning from the decision science and development evaluation literature
2) Identification of critical planning processes associated with each planning stage that can be used as evaluation criteria
3) Selection of adaptation plans for evaluation
4) Scoring of plans against evaluation criteria
5) Categorization of adaptation options embodied within plans

Benjamin L. Preston et al.(2011)

2. The process of evaluation in adaptation (Han, 2007)

1) Organizing stakeholder group
2) Listening stakeholder's opinion in pre-assessment
3) Building adaptation assessment framework through legal, social, political process
4) Vulnerability assessment
5) Identification of priority option through stakeholder's agreement
6) Public hearing

3. The feature of evaluation in adaptation

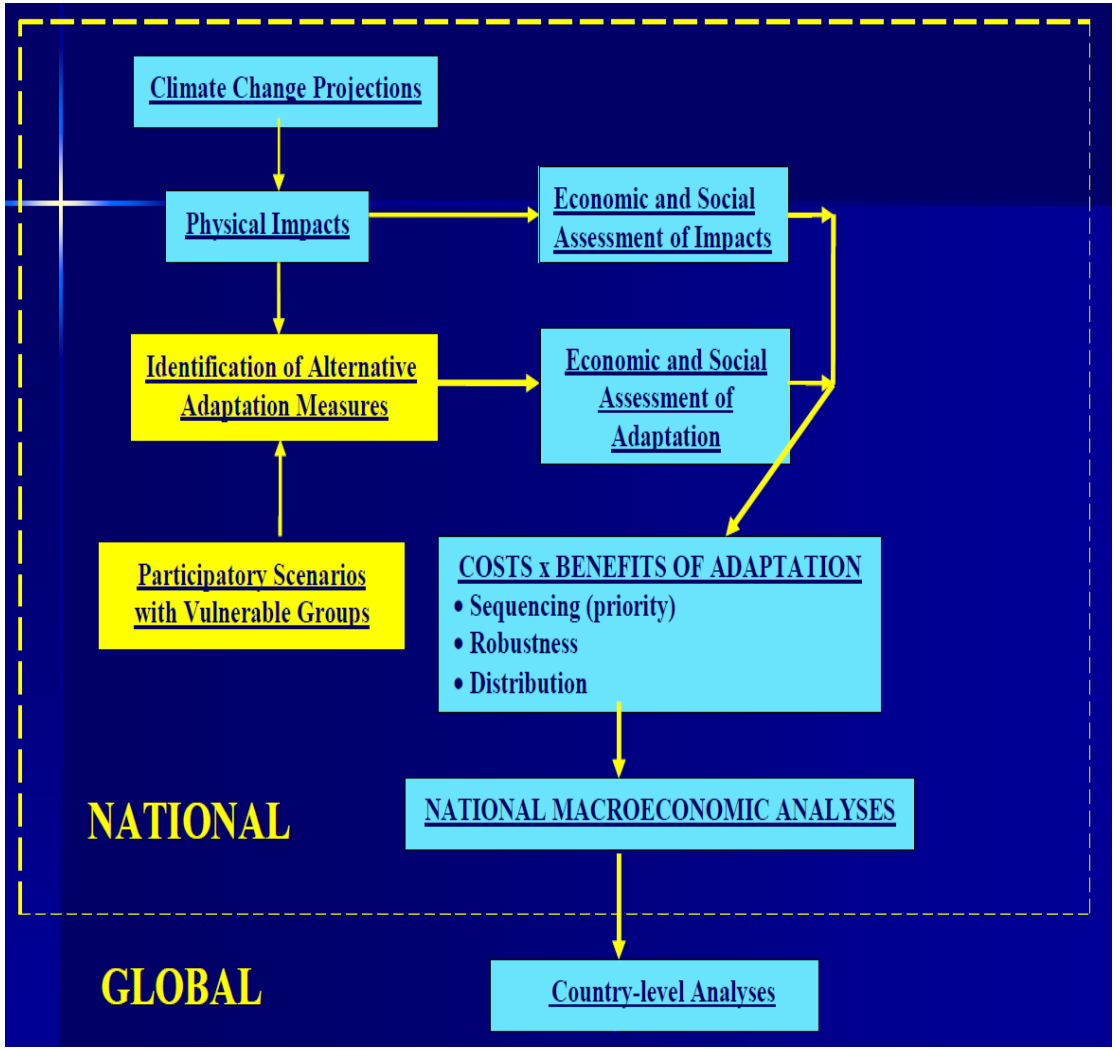
1) Benefits of adaptation occurs far future and uncertain.

2) Hard to measure benefits of adaptation

3) Benefits of adaptation may be realized by combination of options: hard to measure each option's individual benefit

4) Climate change impacts would differ depending on physical, economic, social condition: regional, sectoral analysis required.

4. The criterion of evaluation in adaptation



Sergio Margulis et al.(2008)

- Climate change impacts & risk
- physical, economic, social condition
- feature of adaptation options
- Cos-benefit analysis
- main-streaming
- Environmental aspect
- legal aspect
- Policy aspect

5. Relevant criteria for adaptation assessment

Reference	Füssel (2008)	Perkins et al. (2007)	Gagnon-Lebrun and Agrawala (2006)	Smith et al. (2009b)
Emphasis	Emphasis on procedural aspects of adaptation planning	Emphasis on substantive aspects of adaptation planning	Emphasis on adaptation progress	Emphasis on governance to support adaptation planning
Core Components	1. Clear procedural structure	1. Applicable to different levels of government and types of environmental challenges	1. Historical climatic trends	1. Historical climatic trends
	2. Flexible assessment procedure	2. Sufficient detail for policy construction	2. Climate change scenarios	2. Political leadership
	3. Prioritization of assessment efforts	3. Provides a decision-making framework	3. Impact assessments	3. Institutional organization
	4. Identification of key information needs	4. Includes means to assess sensitivity, adaptive capacity, vulnerability	4. Identification of adaptation options	4. Stakeholder involvement
	5. Inclusion of key stakeholders	5. Suggests steps for adaptive actions	5. Mention of policies synergistic with adaptation	5. Climate change information
	6. Choice of relevant spatial and temporal scales	6. Covers implementation	6. Establishment of institutional mechanisms for adaptation responses	6. Appropriate use of decision analysis techniques
	7. Balanced consideration of current and future risks	7. Provides links to additional resources Includes stakeholders	7. Formulation of adaptation policies/ modification of existing policies	7. Explicit consideration of barriers to adaptation
	8. Management of uncertainties		8. Explicit incorporation of adaptation in projects	8. Funding for adaptation
	9. Policy guidance in the absence of quantitative risk estimates			9. Technology development and diffusion
	10. Prioritization of adaptation actions			10. Adaptation research
	11. Mainstreaming of climate adaptation			
	12. Cross-sectoral integration			
	13. Disease-specific methods and tools			
	14. Assessment of key obstacles to adaptation			

6. Summary of Assessment methods

Method	Level of Precision	Ability to Address Uncertainties	Inputs Needed	Resource Require-ments	Sources
Forecasting by Analogy	Low	No formal provisions.	Detailed historical or contemporary account	Moderate	Glantz, 1991
Screening	Low	No formal provisions	Expertise to make a yes/no evaluation against selected criteria	Low	Benioff and Warren, 1996
Tool for Environmental Assessment and Management	Moderate	Assumptions can easily be modified to test sensitivity	Expertise to establish a relative ranking against selected criteria; computer and software	Moderate	DFI, 1996
Adaptation Decision Matrix	Moderate	Assumptions can easily be modified to test sensitivity	Expertise to establish a relative ranking against selected criteria, ability to estimate costs of measures	Moderate	Benioff and Warren, 1996
Benefit-Cost Analysis	High	Variety of approaches	Data intensive	High	Smith et al., 1997
Cost-Effectiveness Analysis	Useful when either benefits or costs are fixed	Variety of approaches	Moderately data intensive	High	McKenna, 1980
Implementation Analysis	Useful when benefits can be assumed to be positive and comparable among measures	No formal provisions	Expertise to estimate requirements for overcoming barriers	Low	ADB, 1996; IPCC, 1990

Lead Authors(1998) Adaptation to Climate Change: Theory and Assessment" 21p.

7. Role of adaptation evaluation

1) Ensuring reduction in societal and ecological vulnerability:

One of the key aims of climate adaptation is to reduce the vulnerability of human and natural systems to the effects of climate variability and change.(or, in other words, the avoidance of 'dangerous' climate change)

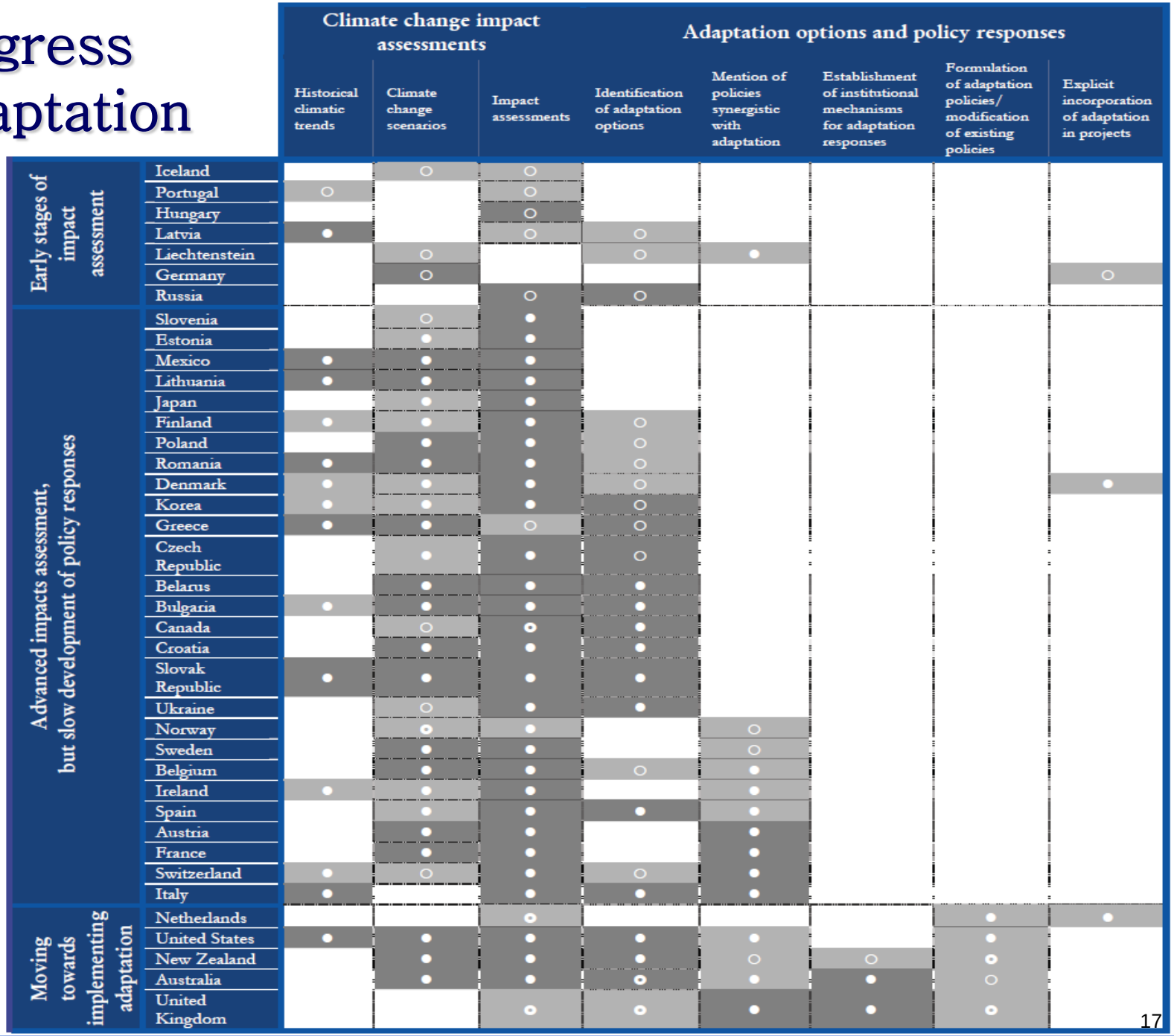
2) Learning and adaptive management:

Climate adaptation is fundamentally a process of social learning.

3) Need for accountability in an evidence-based policy environment:

From a governance perspective, investments in adaptation and the outcomes they achieve must be transparent.

8. Progress on Adaptation



Fréedéeric Gagnon-Lebrun and Shardul Agrawala(2006), "Progress on Adaptation to Climate Change in Deveoped Countries", OECD

Legend:

Coverage:

	Extensive discussion
	Some mention/ limited discussion
	No mention or discussion

Quality of discussion:

●	Discussed in detail, i.e. for more than one sector or ecosystem, and/or providing examples of policies implemented, and/or is based on sectoral/national scenarios
○	Discussed in generic terms, i.e. based on IPCC or regional assessments, and/or providing limited details/no examples/only examples of planned measures as opposed to measures implemented
◘	Limited information in NCs, but references to comprehensive national studies

10. Multi-criteria Analysis for Adaptation Option

Criteria and Indicator	Rating
Win-win options Does option address current climate variability *and* future climate change?	1 = uncertainty 2= based only current 3= Both current and short term (3-5yeas) 4 = medium to long-term (more than 5 years)
Existing risk management Is the option consistent with existing risk management activities?	1= No 2= consistence in short term (extreme event) 3= consistent in long term (average change) 4= both short and long term
Cost effectiveness Can costs and benefits of option be easily determined?	1= very difficult 2= difficult 3= easy 4= very easy
Adaptive flexibility Does the option focus on narrow range of future scenarios, or allow flexibility of response?	1= no, irreversible 2= limit flexible 3= flexible 4= very flexible and easy
Unintended impacts Potential negative spin-off impacts beyond targeted activity?	1=Adverse impact 2= uncertain 3= no impacts 4= benefit impact
Practical considerations Is the option practical and feasible for implementer?	1= unfeasible, impossible 2= More problematic 3= Relatively simple 4= more easily
Knowledge level How certain we are in predicting a particular change in hazard and its impact?	1= uncertainty (less 10%) 2= low certainty (10%~20%) 3= medium certainty (about 50%) 4= High certainty (more than 80%)
Policy Coherence Does option reflect local and national DRR / adaptation plans or studies?	1=only long-term or only medium term need 2=long and medium term need 3= short term need 4= both above all
Emission Reduction Potential Does option have technology potential for c removal and GHG emission reduction	1= no, 2= low 3= Medium 4= high
TOTAL	?/36

- 11. Selection criteria for adaptation options (Klein et al. 1997)
  - # of countries, or population affected by climate change impacts
  - probability of climate change risk
  - Irreversible higher cost impacts
  - Tendency on mal-adaptation
  - Long-term projects like infrastructure

- Urgency
- No-regret characteristics of options
- Co-benefits of other sectors and domains
- Mitigation effect

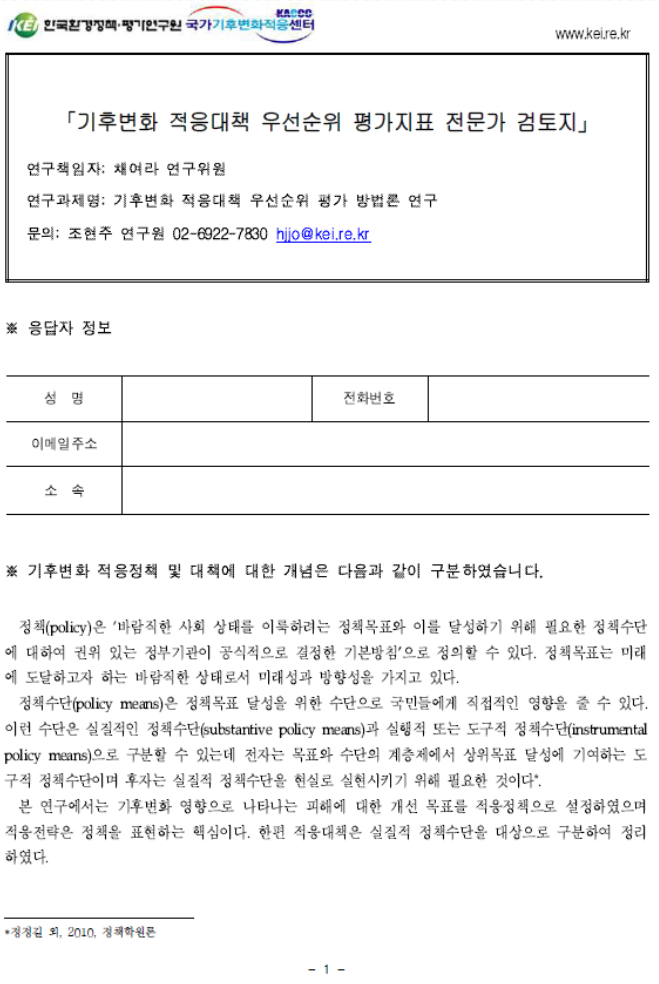
IV. Identifying evaluation criteria

1. Selection of evaluation criteria

- Previous studies
- Recommendation from other institutions, organizations
- Expert survey

Expert survey

- Experts: adaptation scientist ( ), Policy analysits ( ), policy makers ( )
- Evaluation criteria, concepts, assessment methodology, etc.
- Selection among criteria



한국환경정책·평가연구원 국가기후변화적응센터 www.kei.re.kr

「기후변화 적응대책 우선순위 평가지표 전문가 검토지」

연구책임자: 채여라 연구위원

연구과제명: 기후변화 적응대책 우선순위 평가 방법론 연구

문의: 조현주 연구원 02-6922-7830 hjjo@kei.re.kr

※ 응답자 정보

성 명		전화번호	
이메일주소			
소 속			

※ 기후변화 적응정책 및 대책에 대한 개념은 다음과 같이 구분하였습니다.

정책(policy)은 '바람직한 사회 상태를 이룩하려는 정책목표와 이를 달성하기 위해 필요한 정책수단에 대하여 권위 있는 정부기관이 공식적으로 결정한 기본방침'으로 정의할 수 있다. 정책목표는 미래에 도달하고자 하는 바람직한 상태로서 미래성과 방향성을 가지고 있다.

정책수단(policy means)은 정책목표 달성을 위한 수단으로 국민들에게 직접적인 영향을 줄 수 있다. 이런 수단은 실질적인 정책수단(substantive policy means)과 실행적 또는 도구적 정책수단(instrumental policy means)으로 구분할 수 있는데 전자는 목표와 수단의 계층체에서 상위목표 달성에 기여하는 도구적 정책수단이며 후자는 실질적 정책수단을 현실로 실현시키기 위해 필요한 것이다*.

본 연구에서는 기후변화 영향으로 나타나는 피해에 대한 개선 목표를 적응정책으로 설정하였으며 적응전략은 정책을 표현하는 핵심이다. 한편 적응대책은 실질적 정책수단을 대상으로 구분하여 정리하였다.

*정정길 외, 2010, 정책학원론

- 1 -

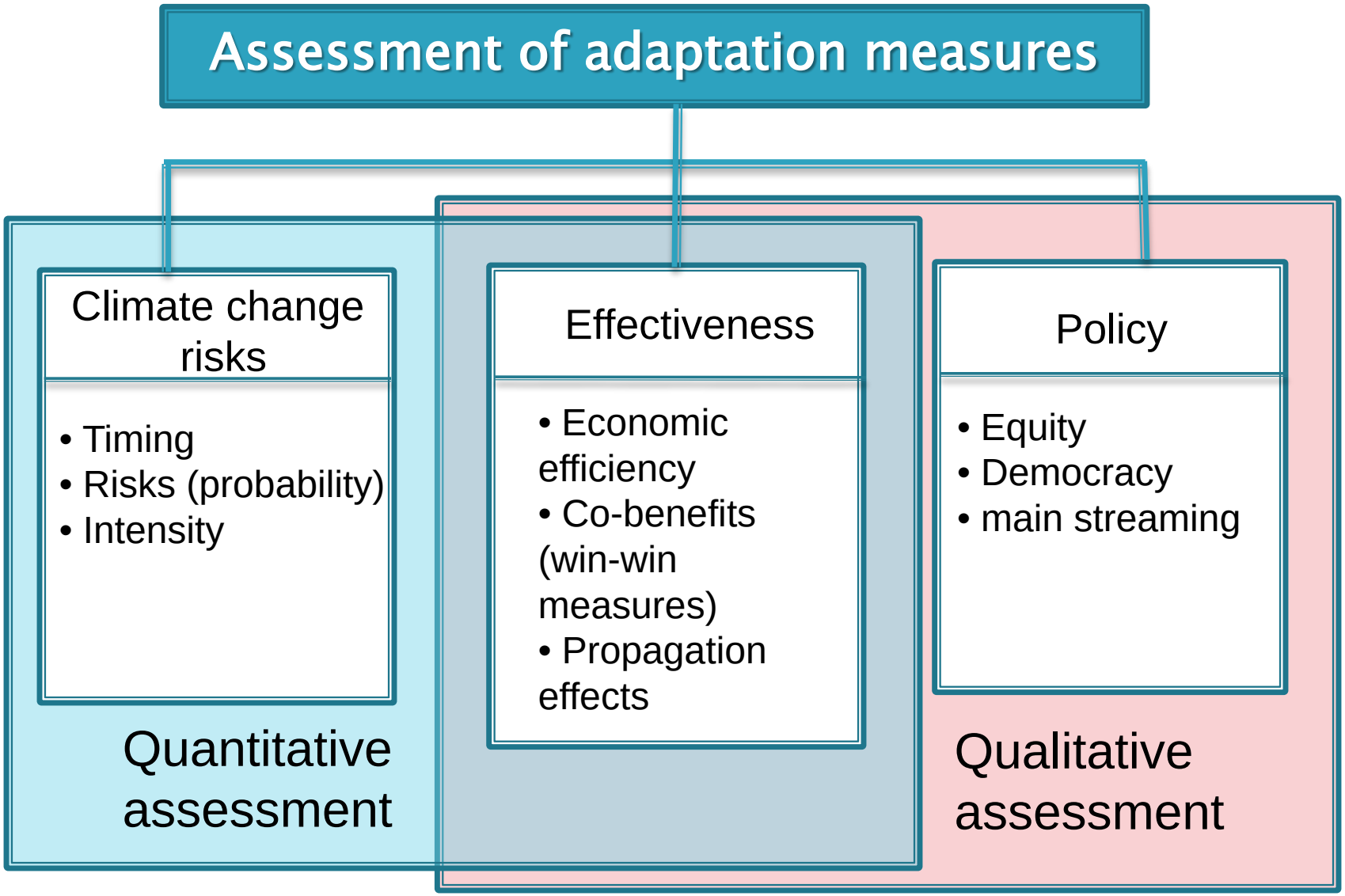
2. Evaluation criteria

Evaluation criteria		concept
대분류	지표	
Climate change risk	Climate change risks	Climate change risks (Probability)
	Climate change impacts	# of people, area affected by climate change
	Timing	Timing of climate change impacts occur
	Intensity of climate change	# of mortality, morbidity, damage cost ($)
Policy	Equity	Consideration of vulnerable group
	Democracy	Consensus on stakeholders' opinion
	main-streaming	- Identification of ways in adaptation can be institutionalized or embedded into existing or new policies and plans
Effectiveness	Economic efficiency	Cost, effectiveness, benefits
	Co-benefits	Exploitation of synergies
	Propagating effect	Communication and outreach

2. Evaluation criteria

Evaluation criteria		Analysis methodology
대분류	지표	
Climate change risk	Climate change risks	Quantitative analysis: Vulnerability analysis Climate change impact assessment
	Climate change impacts	
	Timing	
	Intensity of climate change	
Policy	Equity	Qualitative analysis: Multi criteria analysis, AHP, BAP
	Democracy	
	main-streaming	
Effectiveness	Economic efficiency	Quantitative analysis: cost benefit analysis
	Co-benefits	Quantitative analysis
	Propagating effect	Qualitative analysis

6. Prioritization of climate change adaptation measures



7. Assessment steps

1st Step (Screening)

- No regret :measures with no cost
- Existing measures
- Non-reversible impacts

2nd Step

Climate change impacts and vulnerability assessment

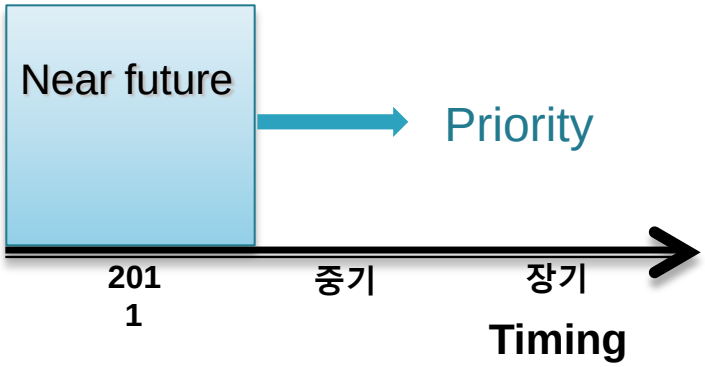
3rd Step

Multi-criteria analysis

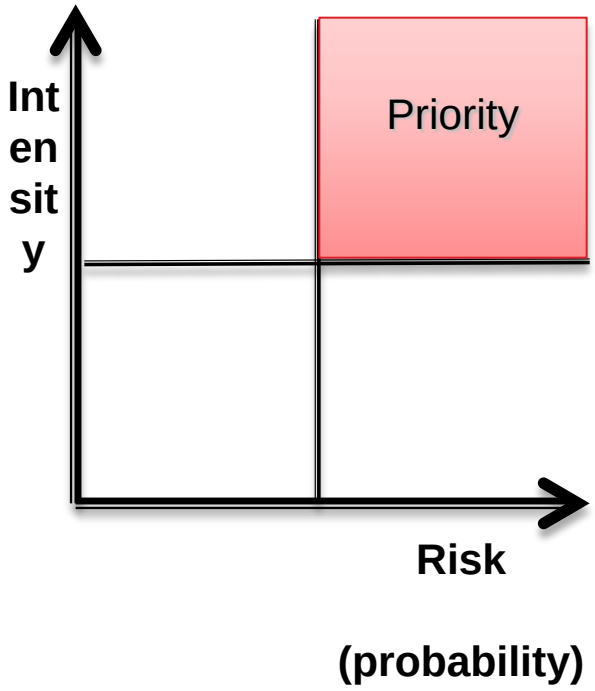
Effectiveness	Policy

8. Climate change impacts and vulnerability assessment

1단계



2단계



V. Further steps

- Expert survey on evaluation criteria, relative weight, assessment scale
- Pre-test on adaptation plan
- To build a prioritizing framework for sectoral adaptation options

THANK YOU!