

**Chapter 2. Measures for security  
in the context of climate change  
(cont)**

**Dr. Luu Viet Dung**

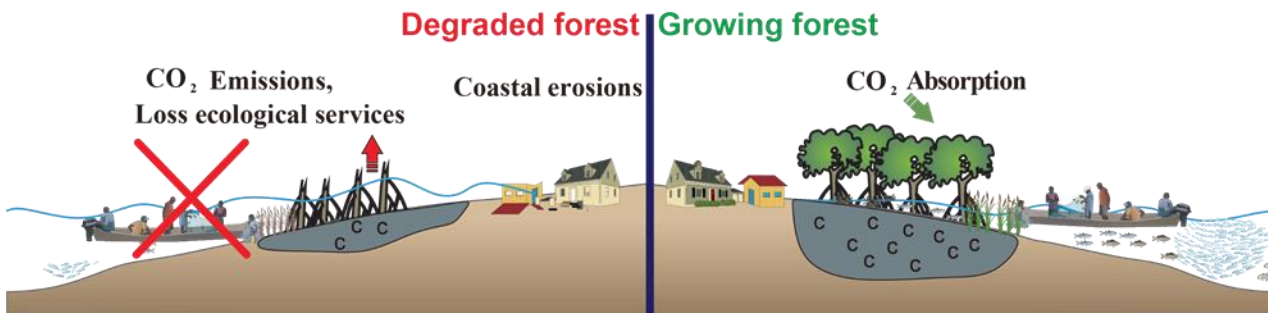
# Lecture Course: Climate change and Security (E3-5)

## WHO AM I?

Dr. Luu Viet Dung

From: Phu Tho, Vietnam

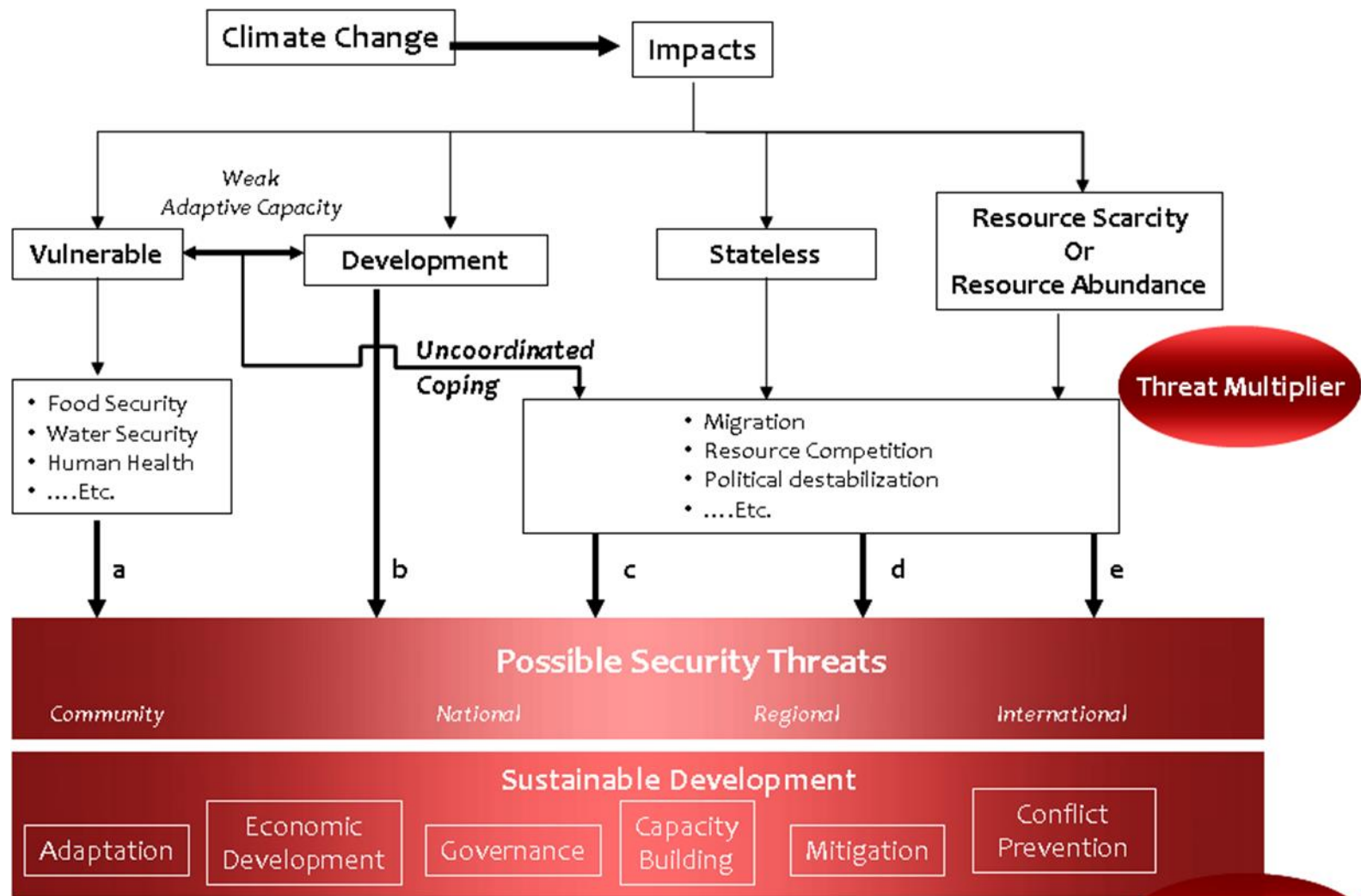
Research interests: Geoenvironment of coastal zones, wise use of natural resources and coastal ecosystems, organic carbon dynamics, climate change, sustainable development



# WHAT IS SECURITY?

- Adger (WRII AR5- Climate change 2014) defines “human security, in the context of climate change, as a condition that exists when the vital core of human lives is protected, and when people have the freedom and capacity to live with dignity. “

# WHAT IS CLIMATE CHANGE SECURITY?



Source: Division for Sustainable Development UN-DESA

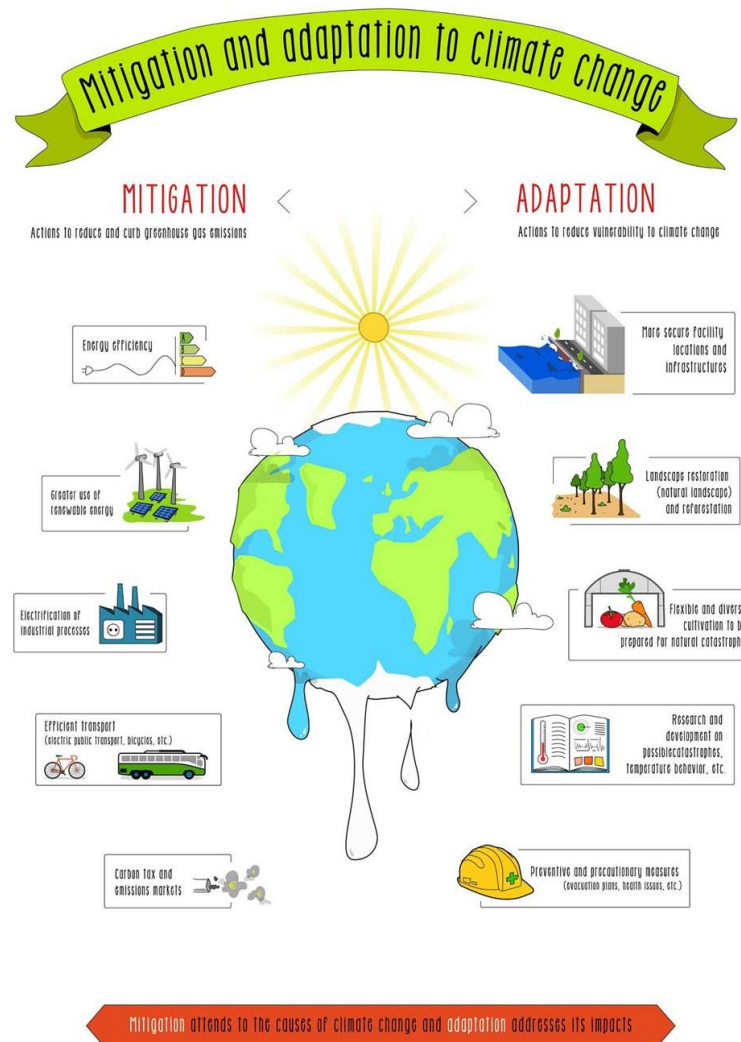
Threat Minimizers

# DISCUSSION

**Why climate change, energy security, national security and human security are related?**

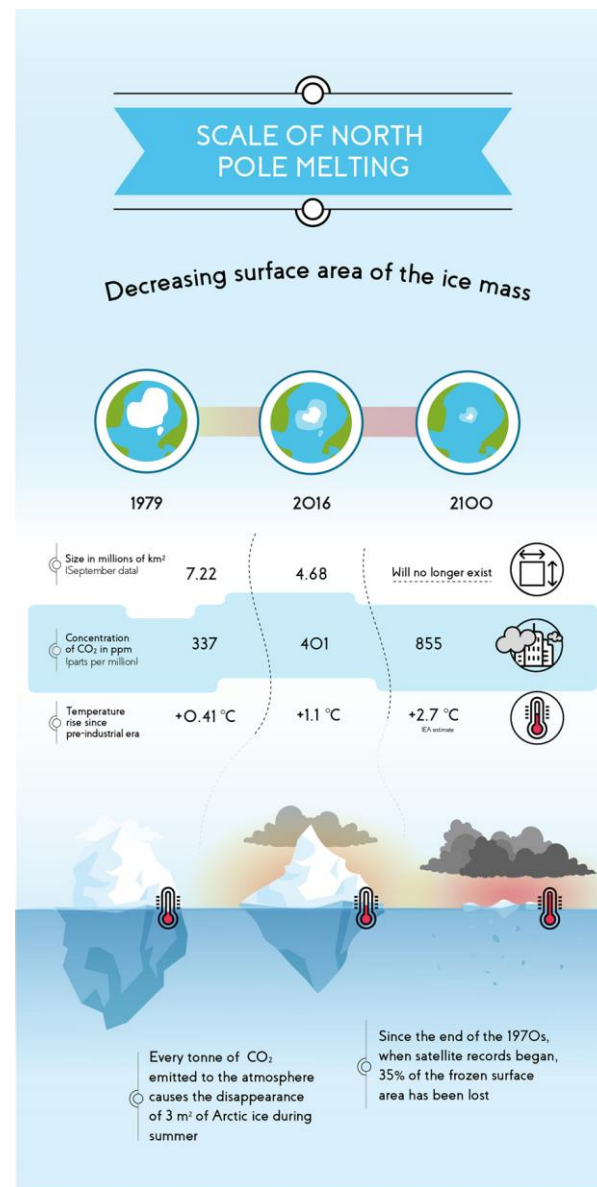
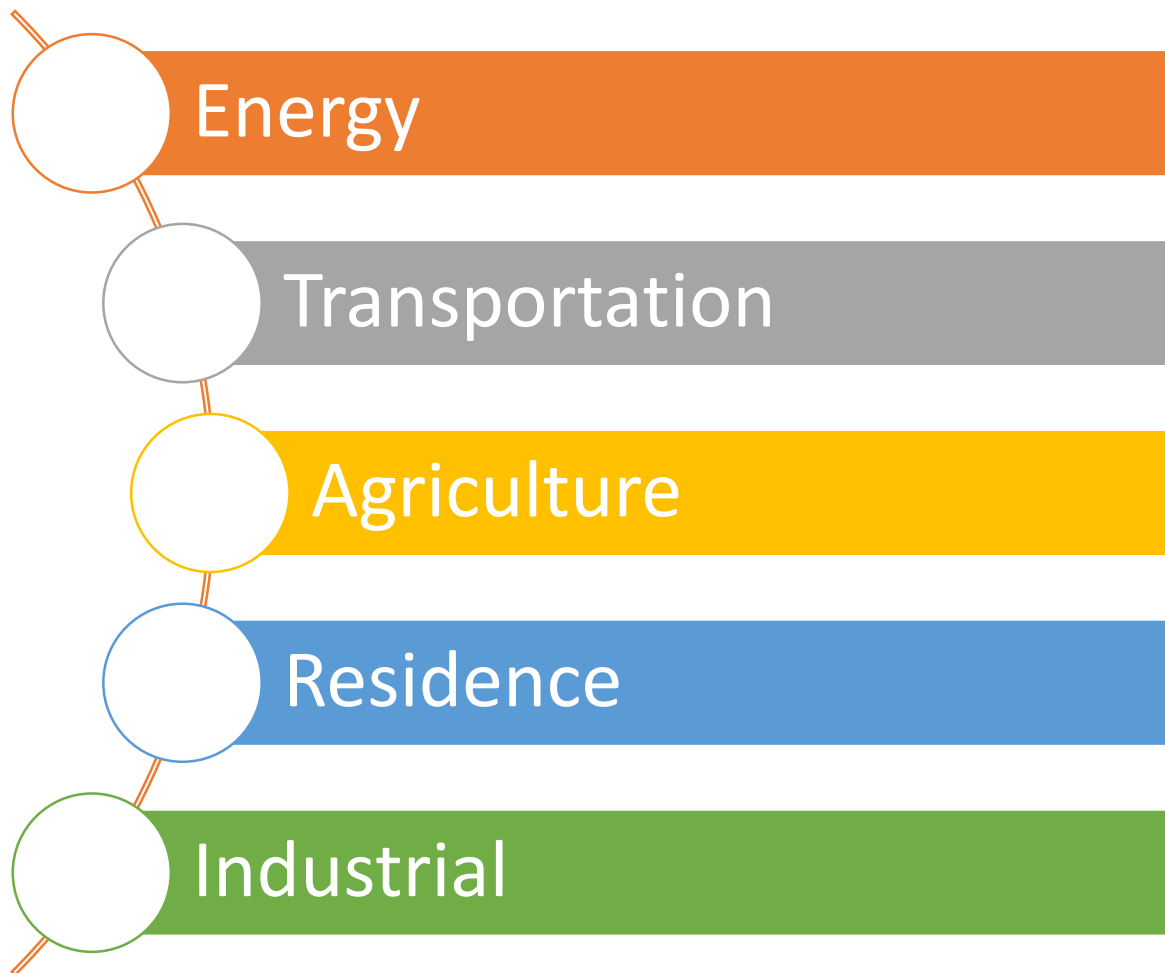
## 2.3. Climate change mitigation for security

- Fisher (IPCC AR4 WG3 2007) **Climate change mitigation** consists of actions to limit the magnitude or rate of long-term global warming and its related effects
- **Mitigation measures:** actions to reduce GHGs



# Chapter 2. Measures for security in the context of climate change

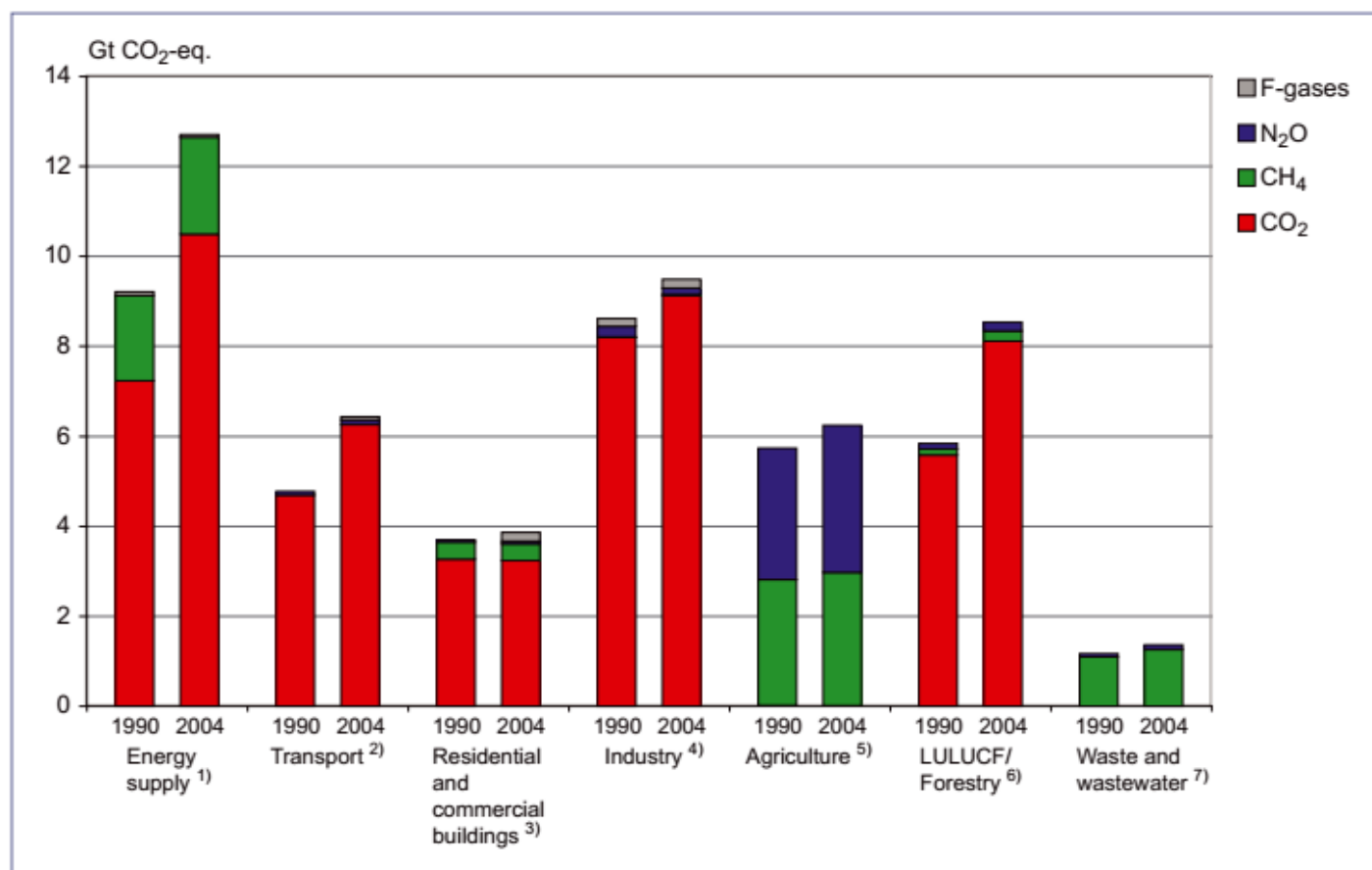
## 2.3. Climate change mitigation for security



## 2.3. Climate change mitigation for security

FIGURE 6.1

Contributions to global greenhouse gas emissions (CO<sub>2</sub> equivalent) by sector and gas in 2004 (IPCC, 2007)



Climate Change 2007: Mitigation of Climate Change. Working Group III Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Figure TS.2a. Cambridge University Press.



### 2.3. Climate change mitigation for security

#### ❖ Energy sectors

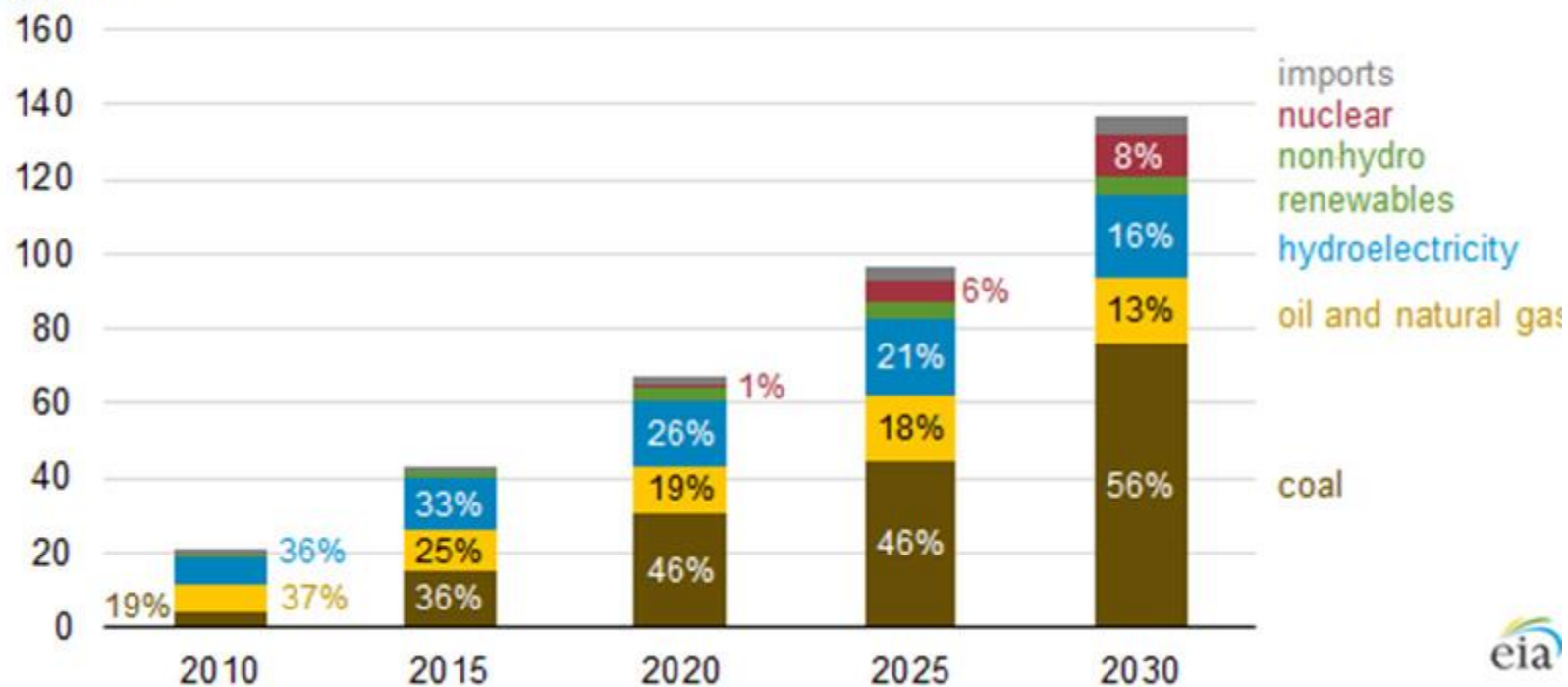
- Energy production and use is the largest source of global greenhouse-gas (GHG) emissions
- The proposed measures for reduce GHGs for energy sector are (From IEA):
  - Increasing energy efficiency in the industry, buildings and transport sectors
  - Progressively reducing the use of the least-efficient coal-fired power plants and banning their construction
  - Increasing investment in renewable energy technologies in the power sector to reach \$400 billion in 2030
  - Gradually phasing out fossil-fuel subsidies to end-users by 2030
  - Reducing the methane emissions arising from oil and gas production

### 2.3. Climate change mitigation for security

#### ❖ Energy sectors

- Reducing GHGs from fossil fuels power plants

Historical and expected electric generating capacity in Vietnam (2010-30)  
gigawatts



Source: International Atomic Energy Agency, 2013 Vietnam Country Nuclear Power Profile  
Note: Hydroelectricity includes pumped storage.

## Chapter 2. Measures for security in the context of climate change

### 2.3. Climate change mitigation for security

#### ❖ Energy sectors

- Enhancing renewable energy (wind, solar, wave, geothermal....)

**Wind power plant**



<http://truyenhinhdulich.vn/diem-den/canh-dong-quat-gio-bac-lieu-241.html>

**Solar power plant**



<http://dienxanh365.com/>

### 2.3. Climate change mitigation for security

#### ❖ Transportation

- Using electric vehicles
- Using Bio-fuels
- Reducing GHGs emission from transportation



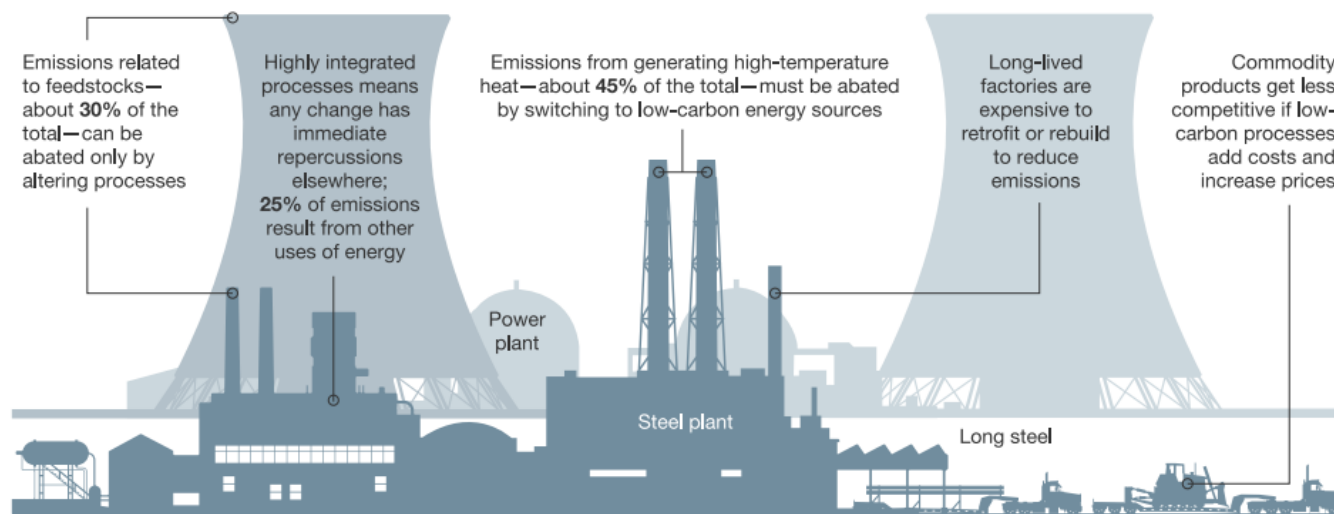
### 2.3. Climate change mitigation for security

#### ❖ Industrial

- Low carbon emission technology
- Industrial innovation
- Enhancing recycle

The steel-production process illustrates the challenges of abating carbon-dioxide emissions from the ammonia, cement, ethylene, and steel sectors.

#### Steel process, example

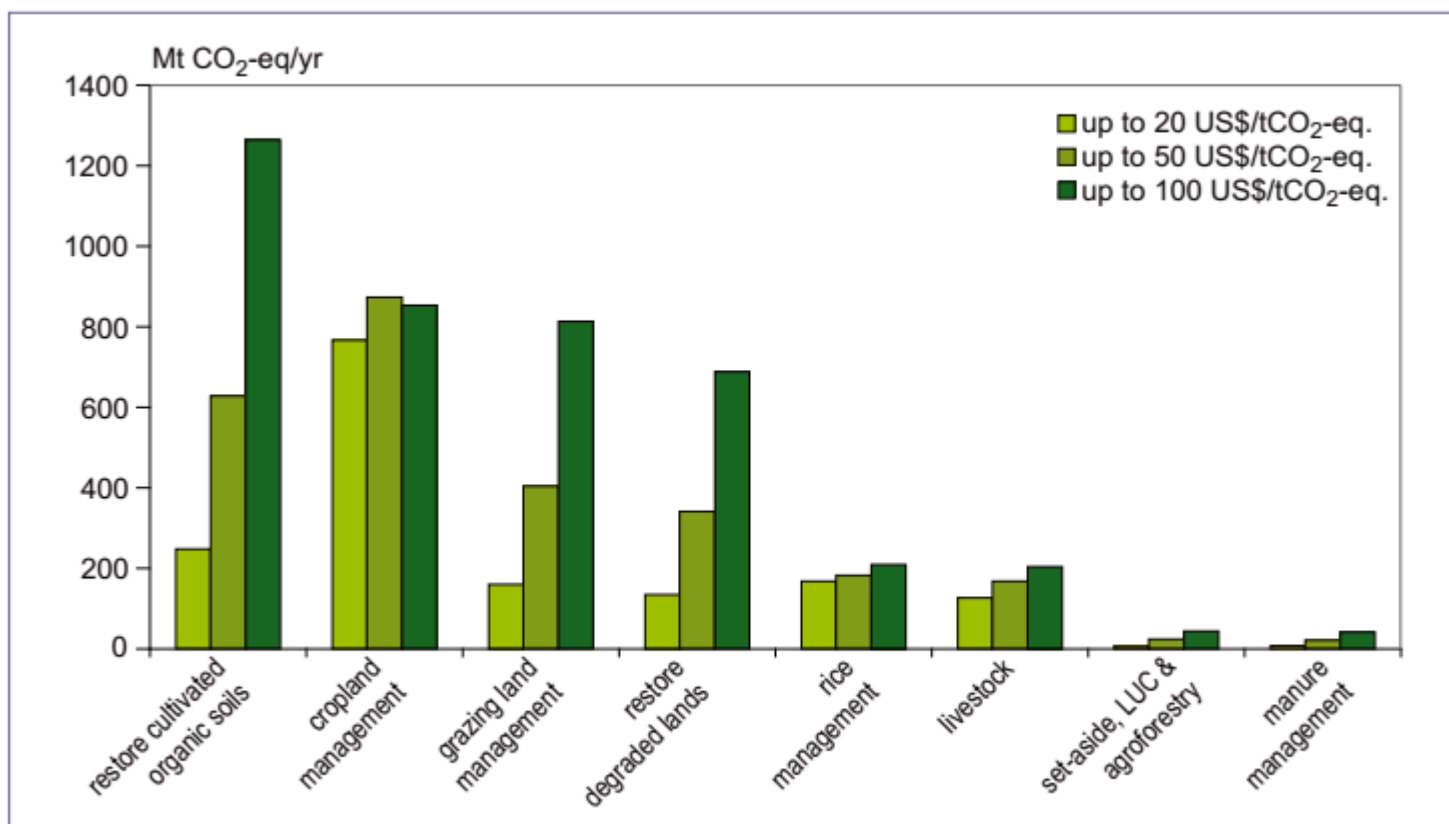


### 2.3. Climate change mitigation for security

#### ❖ Agriculture

FIGURE 6.3

Potential for GHG mitigation through different agricultural activities (IPCC, 2007)



Climate Change 2007: Mitigation of Climate Change. Working Group III Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Figure TS.20. Cambridge University Press.

### 2.3. Climate change mitigation for security

#### ❖ Agriculture

- Organic and zero emissions agriculture
- Carbon sequestration in irrigated soils
- Managing methane emissions from agriculture

TABLE 6.1

Summary of methane emissions from rice (Mt/year) (Yan et al., 2009)

Region/Country	Irrigated Rice	Rainfed + Deep water rice	Total
China	7.41	0.00	7.41
India	3.99	2.09	6.08
Bangladesh	0.47	1.19	1.66
Indonesia	1.28	0.38	1.65
Vietnam	1.26	0.39	1.65
Myanmar	0.80	0.36	1.17
Thailand	0.18	0.91	1.09
Other monsoon Asia	2.32	0.67	2.99
Rest of World	1.20	0.49	1.70

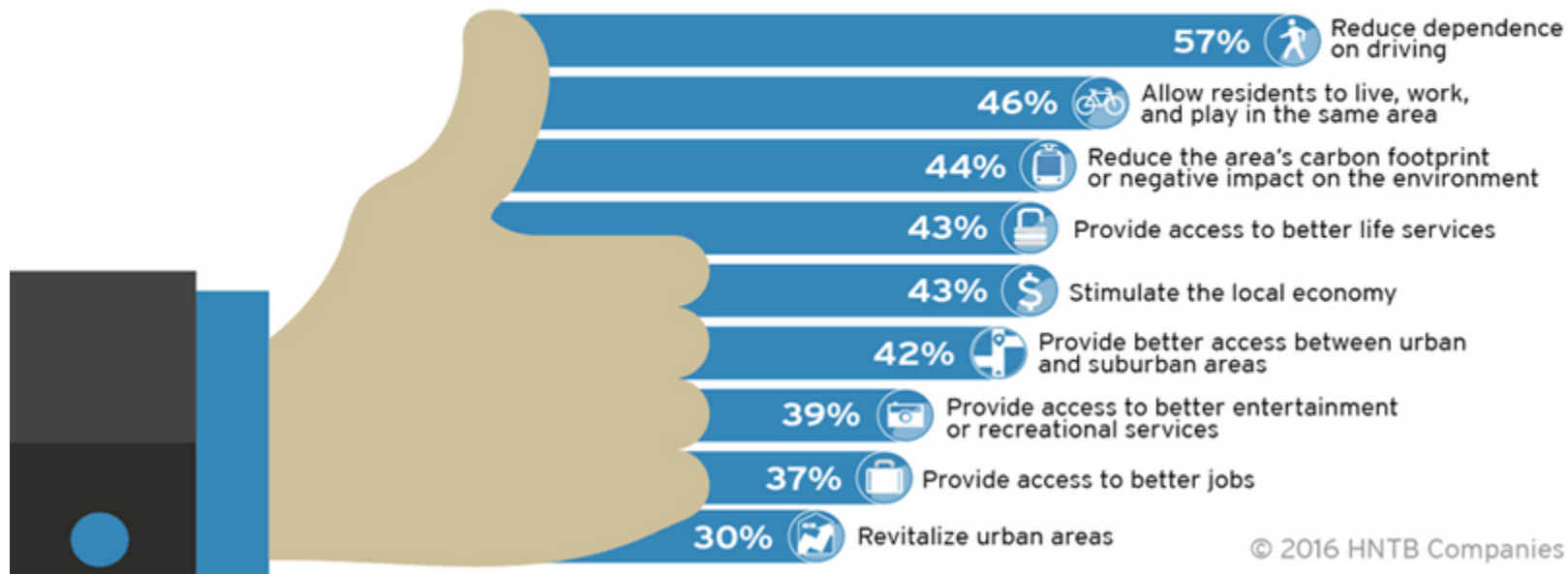
### 2.3. Climate change mitigation for security

#### ❖ Residentials

- Enhancing public services
- Smart building
- Transit-oriented development

#### BENEFITS OF TRANSIT ORIENTED DEVELOPMENT

*Americans believe transit oriented development provides an array of benefits ranging from lifestyle to environmental to economic.*



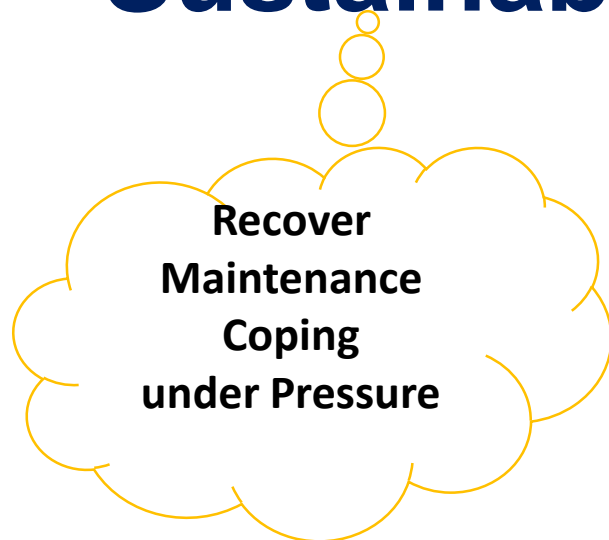


## 2.3. Climate change mitigation for security

**Why mitigation measures  
play important role for  
enhancing security?**

### 2.4. Sustainable livelihood against climate change

# Sustainable livelihood ?



- **Sustainable livelihood:** A livelihood is sustainable when it can cope with and recover from the stresses and shocks and maintain or enhance its capabilities and assets both now and in the future without undermining the natural resource base (Chambers & Conway).

2.4. Sustainable livelihood against climate change

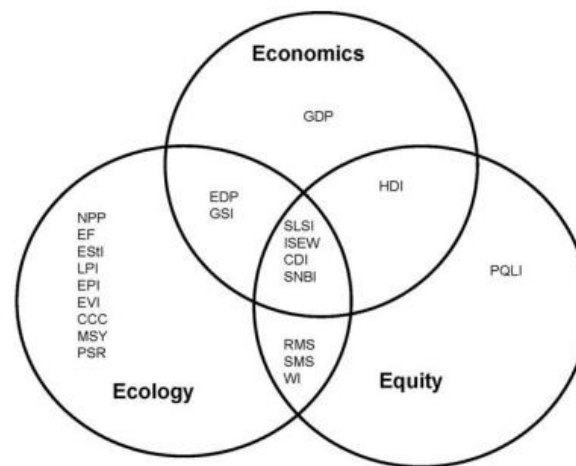
**Why sustainable livelihood  
is important for security?**

## 2.4. Sustainable livelihood against climate change

### ➤ How to measure sustainable livelihood?

- ❖ Using sustainable livelihood index
- ❖ Using DFID frame work

*P.K. Singh, B.N. Hiremath/Ecological Indicators 10 (2010) 442–451*



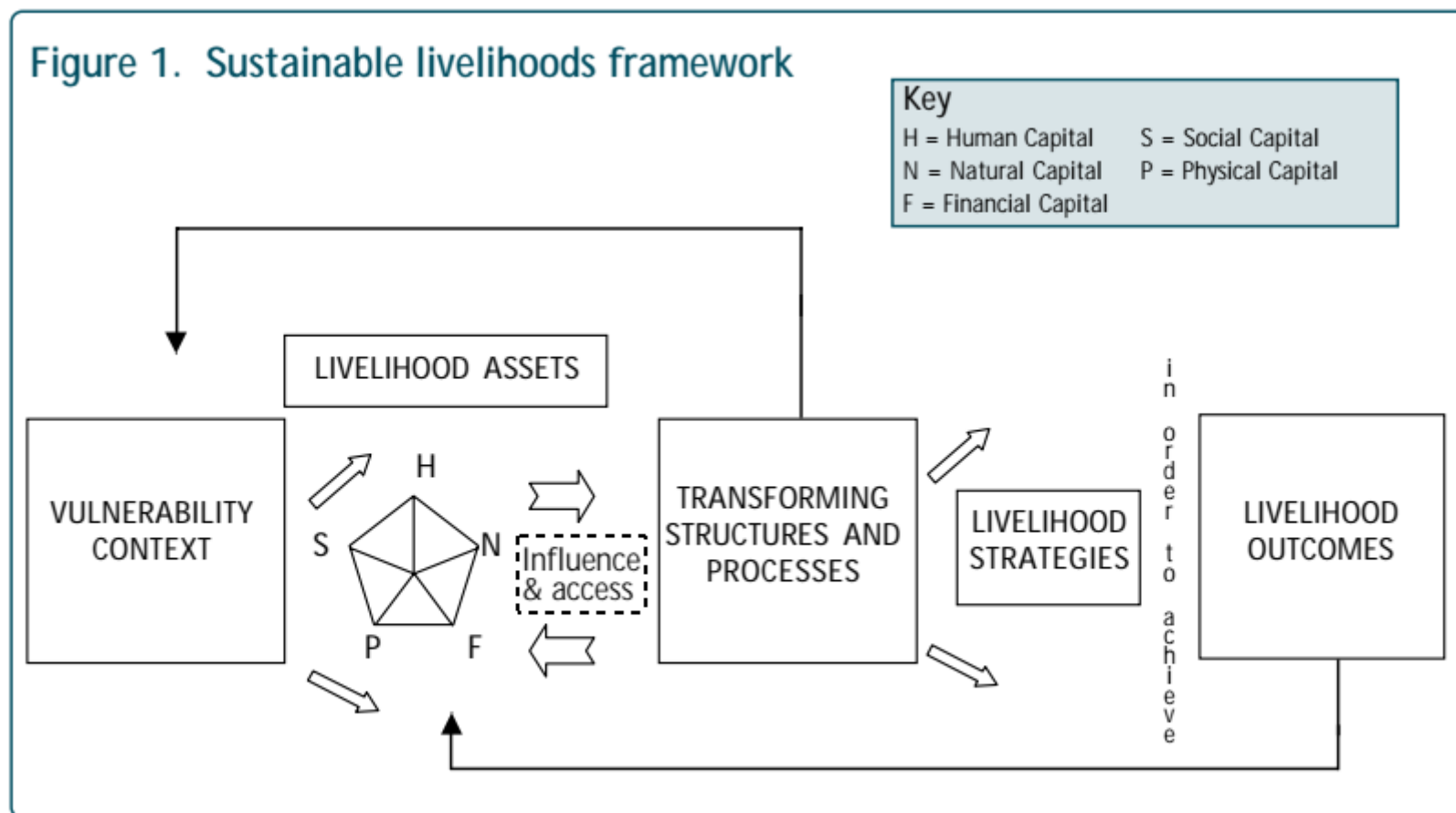
GDP	Gross Domestic Product
PQLI	Physical Quality of Life Index
HDI	Human Development Index
NPP	Net Primary Productivity
EF	Ecological Footprint
ESTI	Environmental Sustainability Index
LPI	Living Planet Index
EPI	Environmental Performance Index
EVI	Environmental Vulnerability Index
MSY	Maximum Sustainable Yield
PSR	Pressure-State-Response model
CCC	Concept of carrying capacity
RMS	Relative Measure of Sustainability
SMS	Safe Minimum Standard
WI	Well Being Index
GSI	Genuine Savings Index
EDP	Environmental Adjusted Domestic Product
CDI	City Development Index
ISEW	Index of Sustainable Economic Welfare
SNBI	Sustainable Net Benefit Index
SLSI	Sustainable Livelihood Security Index

**Note:** Details of the above indicators can be found in Parris and Kates 2003; Lawn 2003; IISD 2004; and Bohringer and Jochem, 2007

**Fig. 1.** Positioning existing indicators of sustainable development.

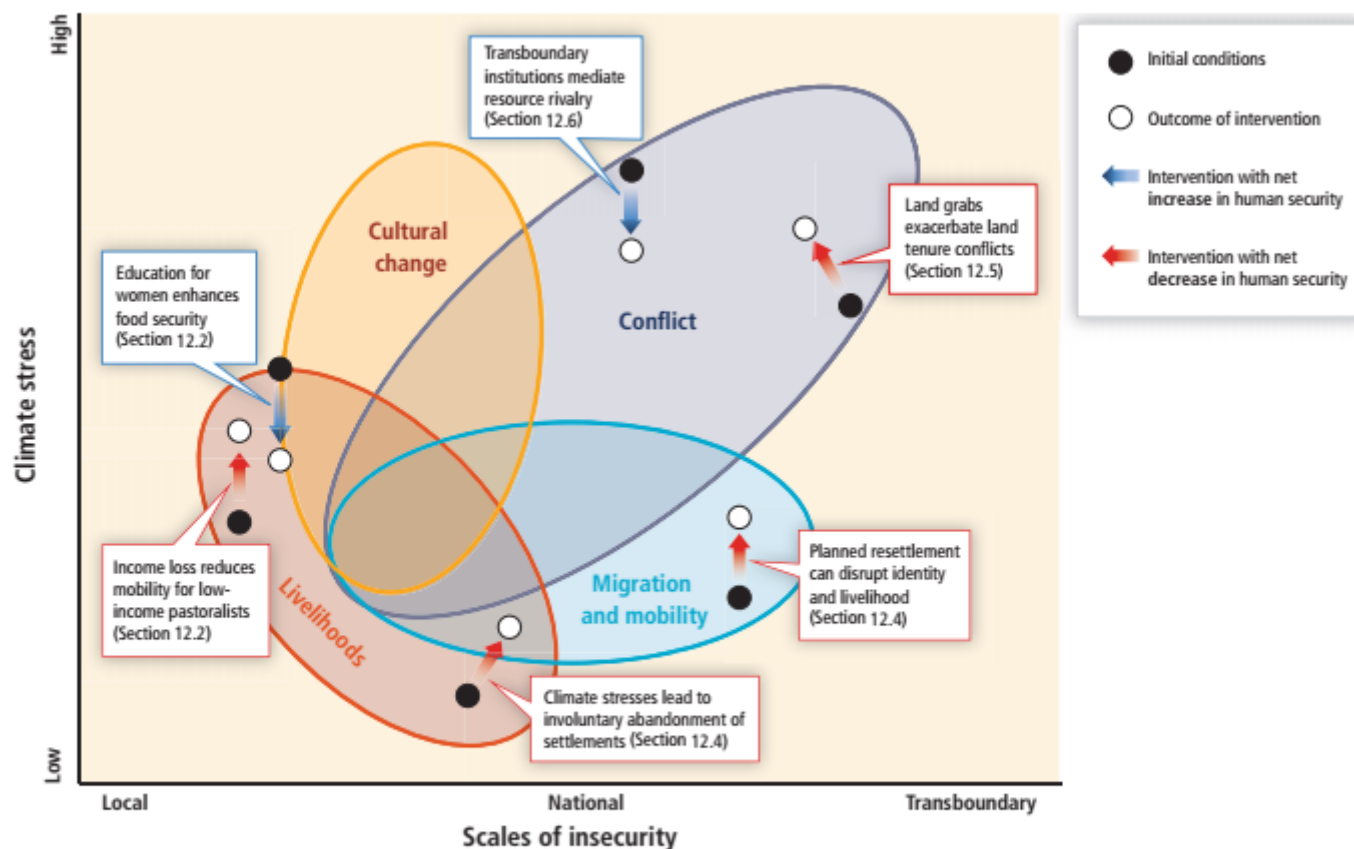
### 2.4. Sustainable livelihood against climate change

#### ➤ How to measure sustainable livelihood?



# Chapter 2. Measures for security in the context of climate change

## 2.4. Sustainable livelihood against climate change

















**Figure 12-3 |** Synthesis of evidence on the impacts of climate change on elements of human security and the interactions between livelihoods, conflict, culture, and migration. Interventions and policies indicated by difference between initial conditions (solid black) and outcome of intervention (white circles). Some interventions (blue arrows) show net increase human security while others (red arrows) lead to net decrease in human security.

Source: Adger (WRII AR5- Climate change 2014)

# Chapter 2. Measures for security in the context of climate change

## 2.4. Sustainable livelihood against climate change

Climate-related drivers of impacts									Level of risk & potential for adaptation																				
 Warming trend	 Extreme temperature	 Drying trend	 Extreme precipitation	 Damaging cyclone	 Storm surge	 Sea level	 Ocean acidification	 Carbon dioxide fertilization																					
Key risk	Adaptation issues & prospects				Climatic drivers	Timeframe	Risk & potential for adaptation																						
<p>Displacement associated with extreme events (<i>high confidence</i>)</p> <p>[12.4.1]</p>	<p>Adaptation to extreme events is well understood but poorly implemented even under present climate conditions. Displacement and involuntary migration are often temporary. With increasing climate risks, displacement is more likely to involve permanent migration.</p>					<table border="1"> <tr> <td></td> <td>Very low</td> <td>Medium</td> <td>Very high</td> </tr> <tr> <td>Present</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Near term (2030 – 2040)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Long term 2°C (2080 – 2100)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>4°C</td> <td colspan="3">[Risk level bar]</td> </tr> </table>		Very low	Medium	Very high	Present	[Risk level bar]			Near term (2030 – 2040)	[Risk level bar]			Long term 2°C (2080 – 2100)	[Risk level bar]			4°C	[Risk level bar]					
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<p>Loss of land, cultural and natural heritage disrupting cultural practices embedded in livelihoods and expressed in narratives, world views, identity, community cohesion, and sense of place (<i>high confidence</i>)</p> <p>[12.3.2, 12.3.4]</p>	<p>Cultural values and expressions are dynamic and inherently adaptable and hence adaptation is possible to avoid losses of cultural assets and expressions. Nevertheless cultural integrity will be compromised in these circumstances.</p>					<table border="1"> <tr> <td></td> <td>Very low</td> <td>Medium</td> <td>Very high</td> </tr> <tr> <td>Present</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Near term (2030 – 2040)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Long term 2°C (2080 – 2100)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>4°C</td> <td colspan="3">[Risk level bar]</td> </tr> </table>		Very low	Medium	Very high	Present	[Risk level bar]			Near term (2030 – 2040)	[Risk level bar]			Long term 2°C (2080 – 2100)	[Risk level bar]			4°C	[Risk level bar]					
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<p>Violent conflict arising from deterioration in resource dependent livelihoods such as agriculture and pastoralism (<i>high confidence</i>)</p> <p>[12.5.1]</p>	<p>Adaptation options: Buffering rural incomes against climate shocks, e.g., through livelihood diversification, income transfers, and social safety net provision; Early warning mechanisms to promote effective risk reduction; Well-established strategies for managing violent conflict that are effective but require significant resources, investment, and political will.</p>					<table border="1"> <tr> <td></td> <td>Very low</td> <td>Medium</td> <td>Very high</td> </tr> <tr> <td>Present</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Near term (2030 – 2040)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Long term 2°C (2080 – 2100)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>4°C</td> <td colspan="3">[Risk level bar]</td> </tr> </table>		Very low	Medium	Very high	Present	[Risk level bar]			Near term (2030 – 2040)	[Risk level bar]			Long term 2°C (2080 – 2100)	[Risk level bar]			4°C	[Risk level bar]					
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<p>Geopolitical competition over access to Arctic resources that escalates into dangerous tensions and crises (<i>high confidence</i>)</p> <p>[12.6.2]</p>	<p>There are international organizations and elements of international law that regulate competition and access and provide mechanisms for resolving disputes. There are strong transnational networks that are relevant for joint problem solving. Hence adaptation action has significant potential to reduce risks associated with geopolitical rivalry.</p>					<table border="1"> <tr> <td></td> <td>Very low</td> <td>Medium</td> <td>Very high</td> </tr> <tr> <td>Present</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Near term (2030 – 2040)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Long term 2°C (2080 – 2100)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>4°C</td> <td colspan="3">[Risk level bar]</td> </tr> </table>		Very low	Medium	Very high	Present	[Risk level bar]			Near term (2030 – 2040)	[Risk level bar]			Long term 2°C (2080 – 2100)	[Risk level bar]			4°C	[Risk level bar]					
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<p>New or exacerbated conflict through land acquisition for climate change mitigation and adaptation (<i>medium confidence</i>)</p> <p>[12.5.2]</p>	<p>Climate change mitigation (e.g., expansion of biofuel production area) and adaptation action (e.g., set-back of coastal land) can exacerbate conflicts when they are already manifest around land and water availability and scarcity. The extent of insecurity and instability from such mitigation and adaptation activities depends on the displacement of populations and the inclusiveness of the planning processes. Careful planning processes can therefore be used to ameliorate the risk of conflict</p>				<p>Cumulative climate risks act as incentives for mitigation and adaptation action</p>	<table border="1"> <tr> <td></td> <td>Very low</td> <td>Medium</td> <td>Very high</td> </tr> <tr> <td>Present</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Near term (2030 – 2040)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>Long term 2°C (2080 – 2100)</td> <td colspan="3">[Risk level bar]</td> </tr> <tr> <td>4°C</td> <td colspan="3">[Risk level bar]</td> </tr> </table>		Very low	Medium	Very high	Present	[Risk level bar]			Near term (2030 – 2040)	[Risk level bar]			Long term 2°C (2080 – 2100)	[Risk level bar]			4°C	[Risk level bar]					
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Source: Adger (WRII AR5- Climate change 2014)

### 2.4. Sustainable livelihood against climate change

- Climate change impacts on livelihoods: Deprivation of basic needs
  - Livelihood assets
  - Water stress and scarcity
  - Loss of property and residence



## Chapter 2. Measures for security in the context of climate change

### 2.4. Sustainable livelihood against climate change

- Climate change impacts on livelihoods: Erosion of livelihood and human capabilities
  - Agriculture and food security
  - Human capital (health, education, loss of lives)

### 2.4. Sustainable livelihood against climate change

- Enhancing livelihood in the context of Climate change (IPCC,2014 WG5RP)
  - *(1) Diversification of income-generating activities in agricultural and fishing systems*
  - *(2) Migration as a risk management strategy, for example, among pastoralists and farmers in rainfed areas and among fishing communities*
  - *(3) The development of insurance systems, particularly among vulnerable groups*
  - *(4) The education of women*

## Chapter 2. Measures for security in the context of climate change

### 2.4. Sustainable livelihood against climate change

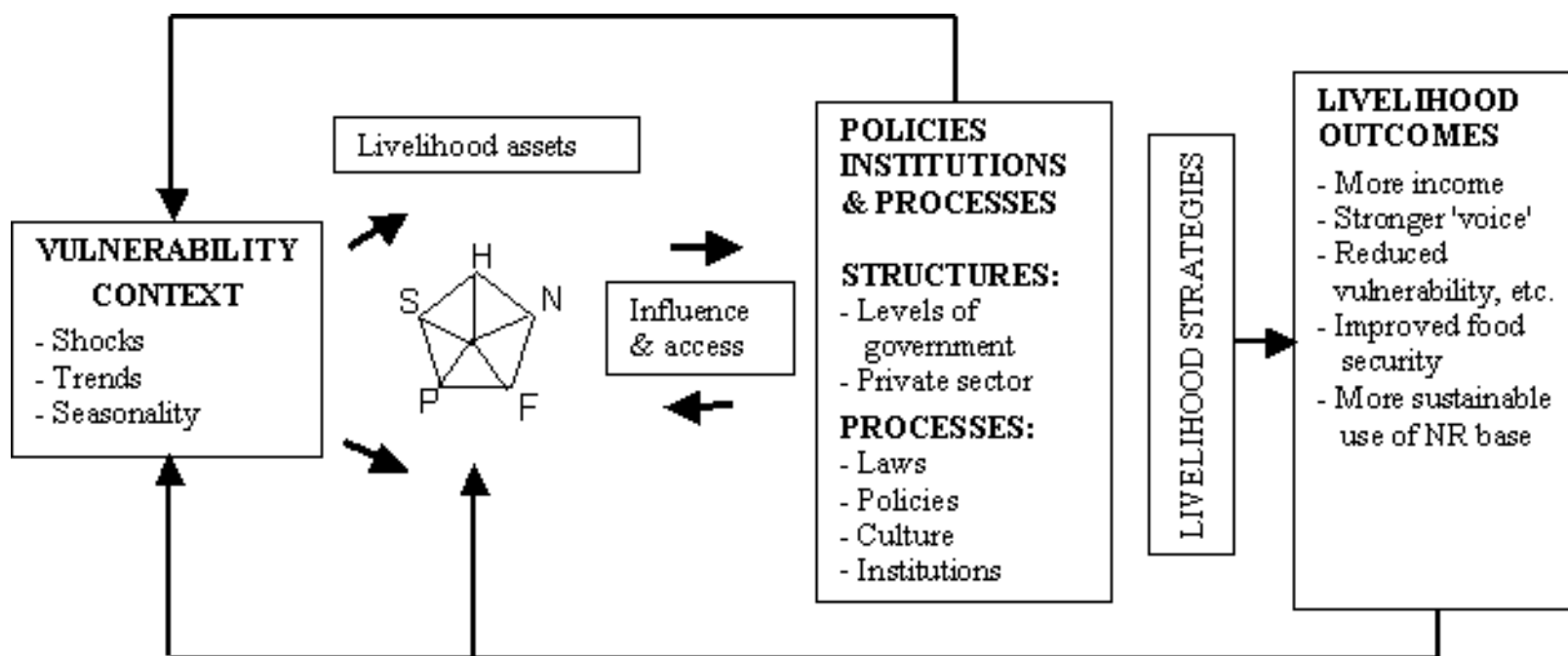
- ❖ Diversification of income-generating activities in agricultural and fishing systems



## Chapter 2. Measures for security in the context of climate change

### 2.4. Sustainable livelihood against climate change

- ❖ Diversification of income-generating activities in agricultural and fishing systems



F = Financial capital  
P = Physical capital  
S = Social capital  
H = Human capital  
N = Natural capital

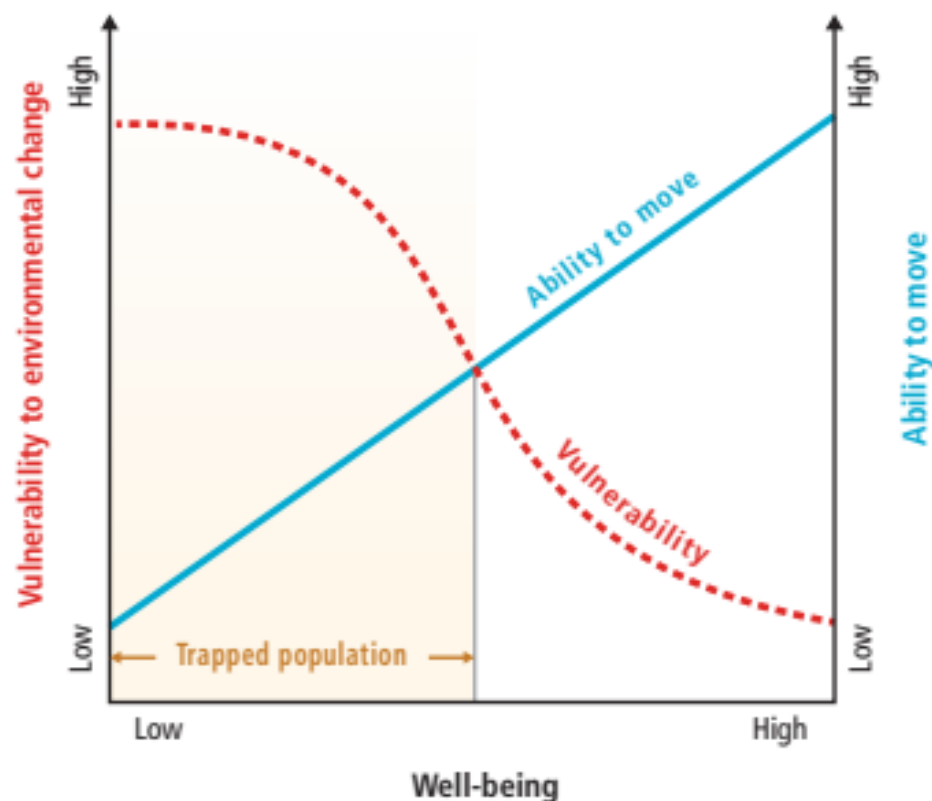
Good livelihoods = better sustainability

## Chapter 2. Measures for security in the context of climate change

### 2.4. Sustainable livelihood against climate change

#### ❖ Migration in the context of climate change

- Multiple Driving forces of migration;
- Populations change by extreme weather events
- The migrants from rural to urban in the context of climate change

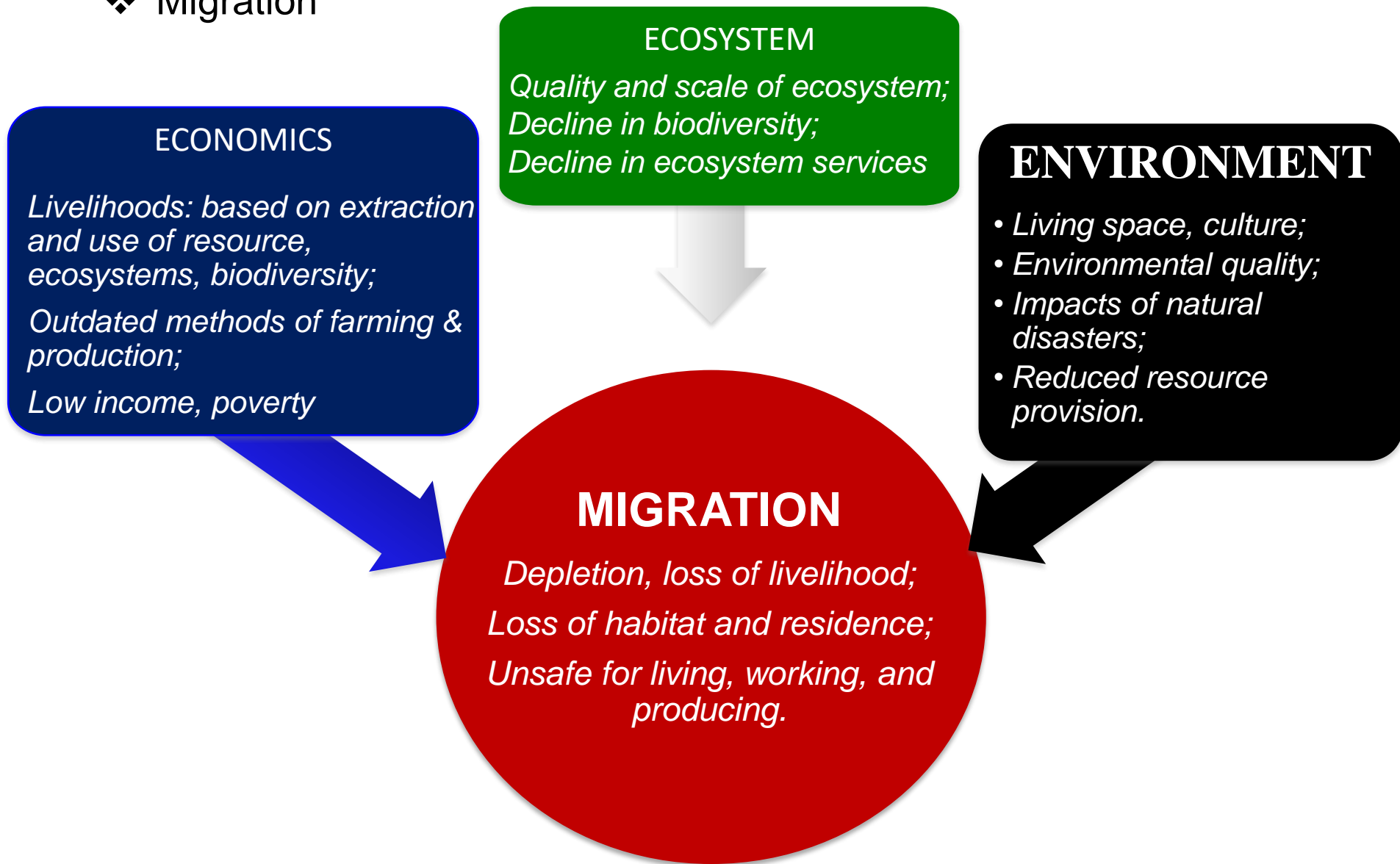


**Figure 12-1** | Relationship between vulnerability to environmental change and mobility showing that populations most exposed and vulnerable to the impacts of climate change may have least ability to migrate (adapted from Foresight, 2011; Black et al., 2013).

## Chapter 2. Measures for security in the context of climate change

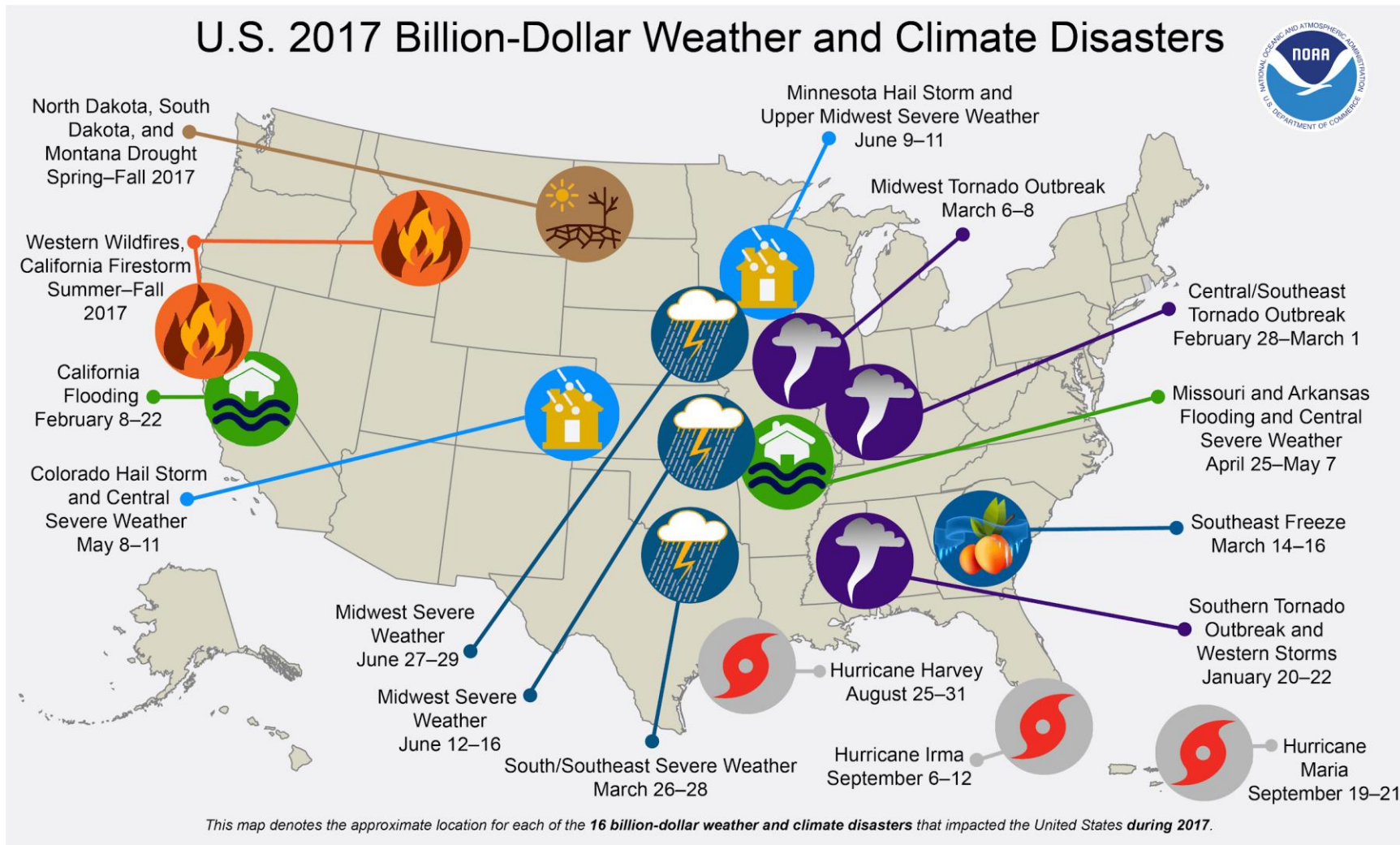
### 2.4. Sustainable livelihood against climate change

#### ❖ Migration



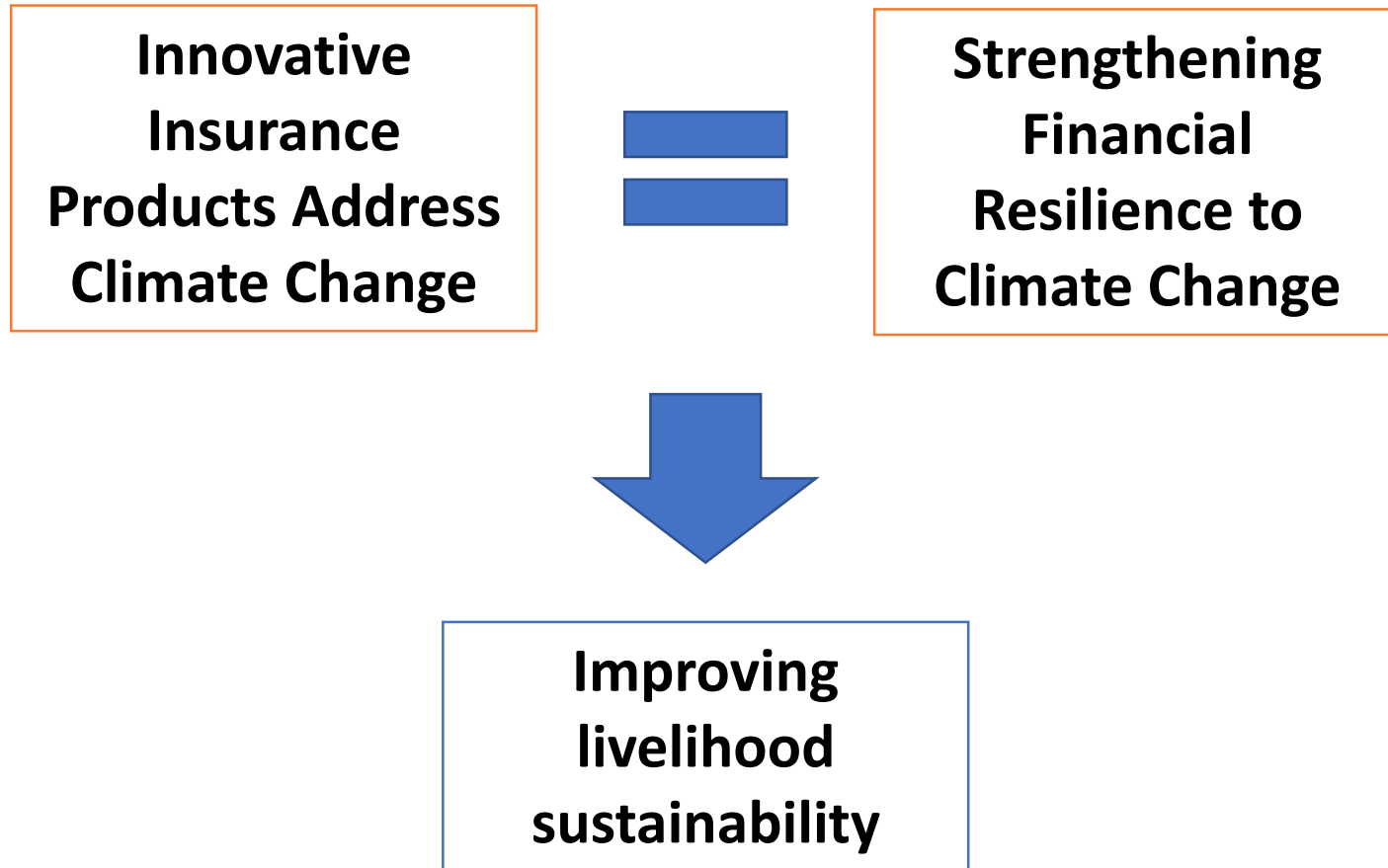
## 2.4. Sustainable livelihood against climate change

### ❖ Development of insurance systems



### 2.4. Sustainable livelihood against climate change

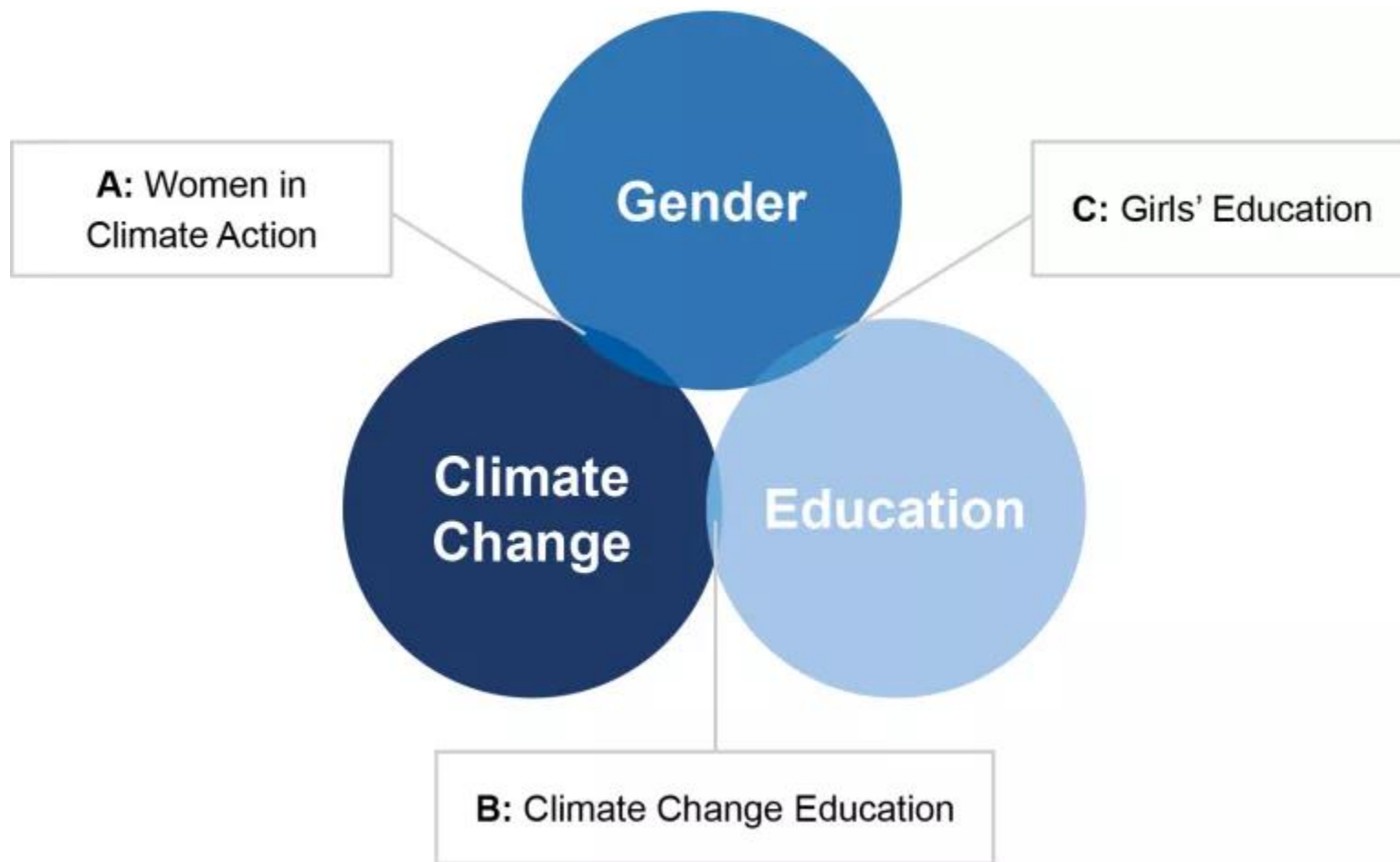
- ❖ Development of insurance systems





### 2.4. Sustainable livelihood against climate change

#### ❖ Education for women



## 2.4. Sustainable livelihood against climate change

**What are solutions for enhancing sustainable livelihoods in developing countries?**