

Concepts of (Social) Vulnerability and Data for Vulnerability Assessment

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The University of the South Pacific

Workshop on

**Social Vulnerability: Concept, indicator
development and mapping**

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APN workshop on Vulnerability Mapping

Chennai, India



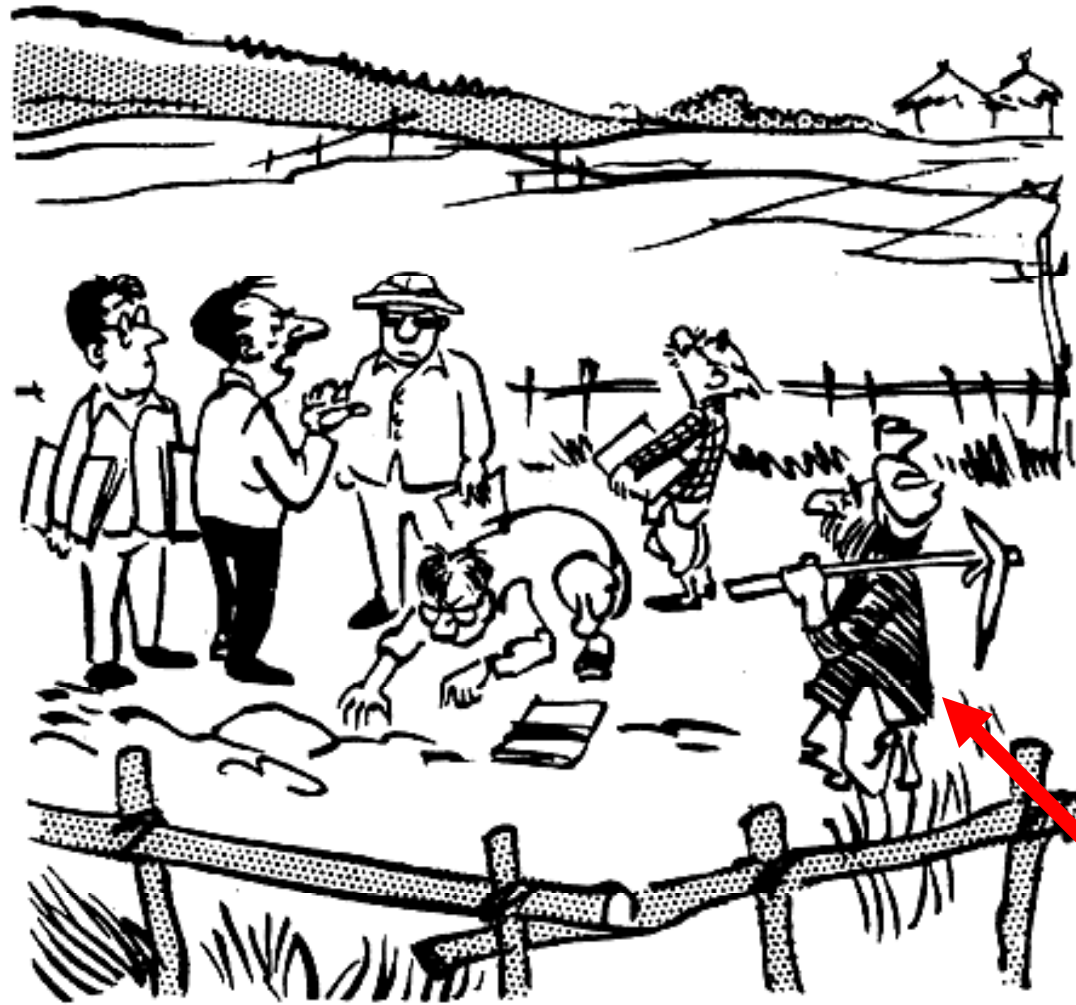
Concepts of Social Vulnerability

- Food (In)Security and Early Approaches to Vulnerability
- From Food (In)security to Social (In)security
- Theory, Empiry and Methodology
Vulnerability Mapping
Vulnerability Assessment

A tropical beach scene with palm trees and a thatched roof. The image is slightly blurred, suggesting a breeze. The sky is a clear, bright blue. The palm trees are in the foreground and middle ground, with their fronds swaying. A thatched roof is visible in the upper right corner. The overall atmosphere is serene and tropical.

Early Approaches to Vulnerability

Hunger, Famine and Food (In)Security



**We are all here,
Sir -- fertilizer
supplier, pest
controller, seed
adviser and soil
tester -- but I
wonder who
that man is
standing over
there !!**

Paradigms in Food Security Research

There are two major traditions explaining Food (In)security:

1. Food **Availability** Decline Paradigm
2. Food **Entitlement** Decline Paradigm



Food **Availability** Decline Paradigm

Food (In)Security is mainly a function of the **production of food.**

- Food Insecurity either happens (following a (Neo-) Malthusian approach) because population is too fast increasing and food production can not keep pace.

Or

- Food production is disturbed / interrupted by natural or other hazards.

The result of both is that not enough food is **available**

New Approaches to Food Security and Famine Research

- Before Famine was explained by a Food Availability Decline (FAD Approach).
- Hunger is the consequence of not enough food being produced or even of a decline in food production (availability)
- To avoid hunger and starvation food production has to be increased.

Sen's Major Arguments on the Bengal Famine

- Food availability decline (FAD) was not the explanation for the famine.
 - **The crop availability was only five percent lower than normal in 1943 and was thirteen percent higher than in 1941, when there was no famine**
- Argues that wages failed to "anticipate" the increase in food prices
 - **Rice prices tripled, wages did not reflect this change**
- People outside agriculture were most affected
 - **fishermen, craftsmen, agricultural labourers, transport workers, and general labourers**

Sen's Major Arguments on the Bengal Famine

- Those who cultivated rice were least affected
- Sen explains the famine in a decline of entitlements
- Sen's arguments were not entirely new, but as a result of his work the attention shifted towards people's vulnerability to famine.
- Many empirical as well as conceptual studies were the result of this new paradigm.

Food **Entitlement** Decline Paradigm

Food (In)Security is mainly a function of the **Entitlement people have over food.**

- Food Insecurity happens (structuralist approach) because of a decline in the control people can exercise over food. Aspects of access, capabilities and the factors that contribute to both play a major role.

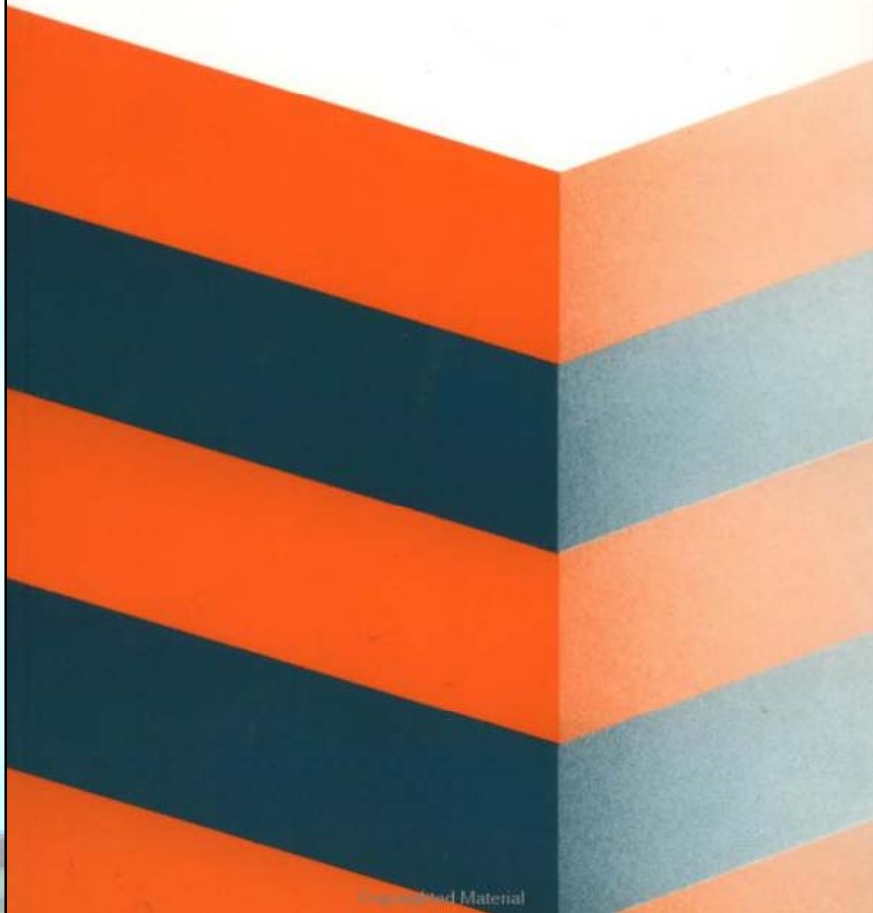
People go hungry because they can not establish control over food that actually is available. It is a **decline in entitlement** that causes hunger.

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AMARTYA SEN

Poverty and Famines

An Essay on Entitlement and Deprivation



Copyrighted Material

DEVELOPMENT AS FREEDOM



AMARTYA SEN

WINNER OF THE NOBEL PRIZE IN ECONOMICS

"Fascinating. . . . The overall argument [is] eloquent and probing."
—*The New York Times*

Strategies arising from the Paradigms

Food Availability Decline

- To grow more food
- Green Revolution / Bio-Technology

Food Entitlement Decline

- To strengthen people's capabilities / capacities when accessing food.
- To reduce people's vulnerabilities
- To make people's livelihoods more secure and sustainable

Food security...

... exists when all people, at all times, have **physical and economic access** to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

World Food Summit 1996)



.... is much more than just food production....

A tropical beach scene with palm trees and a thatched roof. The image is slightly blurred and has a soft, warm color palette. The text is overlaid on the image.

Concepts of Social Vulnerability

From Food (In)Security
to
Social Vulnerability

The structural dimension of vulnerability

- Vulnerability

"Vulnerability has (thus) two sides: an external side of *risks*, shocks and stress to which an individual or household is subject; and an internal side which is defencelessness, meaning a lack of means to *cope* without damaging loss"

Robert Chambers 1989

Progression of Vulnerability

Root Causes ⇨ **Dynamic Pressures** ⇨ **Unsafe Conditions** ⇨ **Disaster** ⇨ **Hazard**

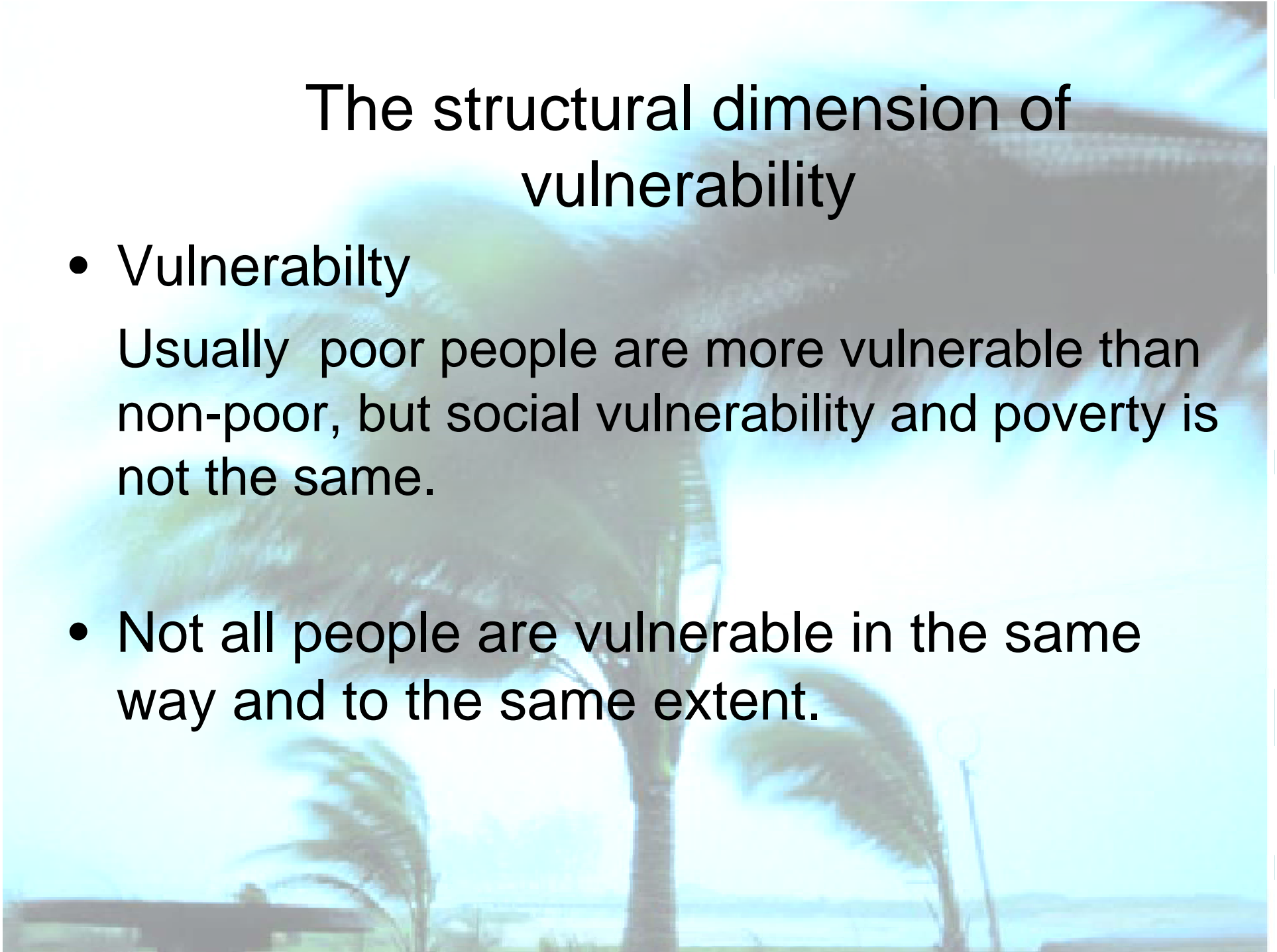
<p>Limited access to</p> <ul style="list-style-type: none"> • Resources • Structures • Power 	<p>Lack of</p> <ul style="list-style-type: none"> • Institutions • Training • Skills • Investment • Markets • Press freedom • Civil Society 	<p>Fragile physical Environment</p> <ul style="list-style-type: none"> • Dangerous locations • Unprotected Structures 	<p>Risk</p> <p>=</p>	<p>Earthquake Strom Flooding Landslide Drought</p>
<p>Ideologies</p> <ul style="list-style-type: none"> • Political Systems • Economic Systems 	<p>Macro Forces</p> <ul style="list-style-type: none"> • Population Growth • Urbanization • Debt repayment • Deforestation 	<p>Fragile local economy</p> <ul style="list-style-type: none"> • Livelihoods at risk • Low income <p>Vulnerable society</p> <ul style="list-style-type: none"> • Groups at risk • Little capacity to cope 	<p>Hazard</p> <p>+</p>	<p>Virus and Pest</p>
		<p>Public Action</p> <ul style="list-style-type: none"> • Lack of preparedness 	<p>Vulnerability</p>	

The structural dimension of vulnerability

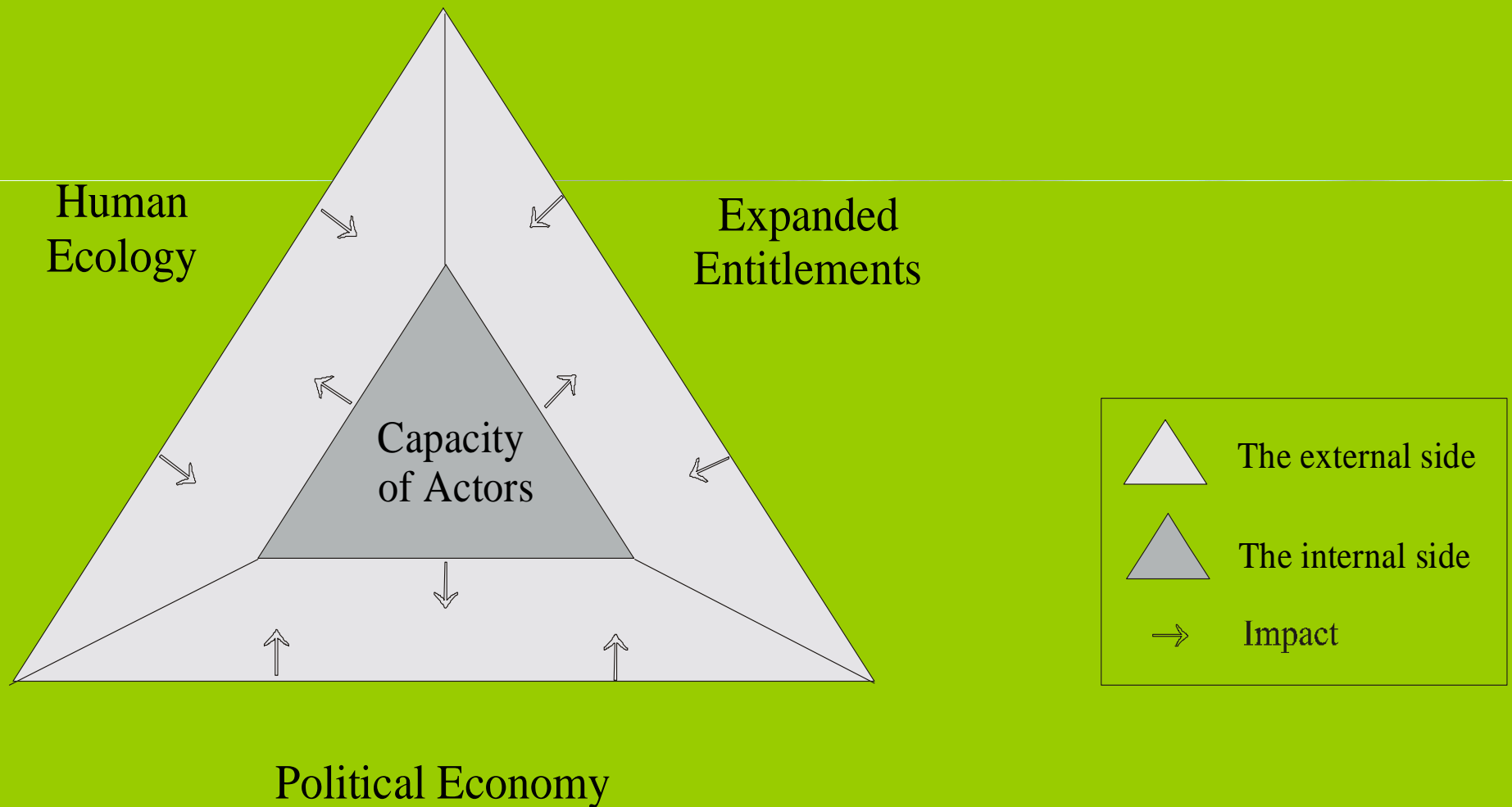
- Vulnerability

Usually poor people are more vulnerable than non-poor, but social vulnerability and poverty is not the same.

- Not all people are vulnerable in the same way and to the same extent.



The structural dimension of vulnerability



Political Economy

- The perspective of political economy provides the macro structure in which resource endowments, i.e. the distribution of assets, and patterns of entitlements are embedded. Political economy is concerned with the distribution of power in society. It looks at long-term structural developments, including class processes, conflicts and crises, which cause and perpetuate *existing* social inequalities, access profiles and processes of marginalization.

Human Ecology

- The term human ecology originally refers to the application of ecological concepts to social processes. Human ecology studies the relationship between people and their social and physical environments. For the present context, one may define that "*human ecology is a way to understand both the risk of environment which vulnerable groups confront, and the 'quality' of their resource endowment*"

(Bohle et al. 1994)

Expanded Entitlements

- According to Drèze and Sen (1989) entitlements are defined as "*the set of alternative bundles of commodities over which one person can establish command*". A wage labourer's entitlement is given by "*what he can buy with his wages, if he does in fact manage to find employment*".
- The authors expanded their definition to include non-legal, cultural and intra-familial entitlements.

The structural dimension of vulnerability

- Vulnerability

"Vulnerability has (thus) two sides: an **external side** of *risks*, shocks and stress to which an individual or household is subject; and an **internal side** which is defencelessness, meaning a lack of means to *cope* without **damaging loss**"

Robert Chambers 1989



Source: H.G. Bohle

Concepts of Social Vulnerability

From Vulnerability
to
Livelihood Security

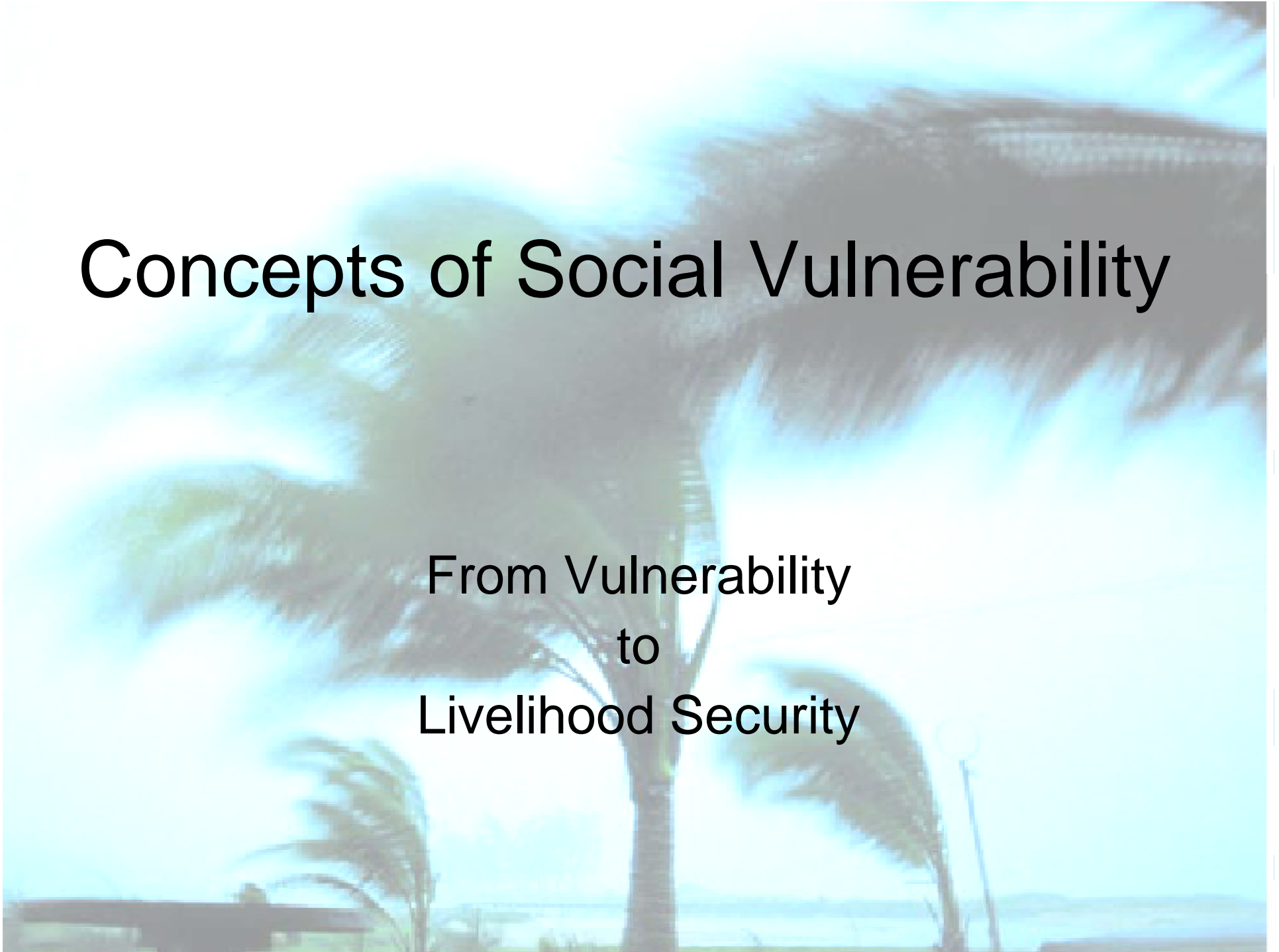
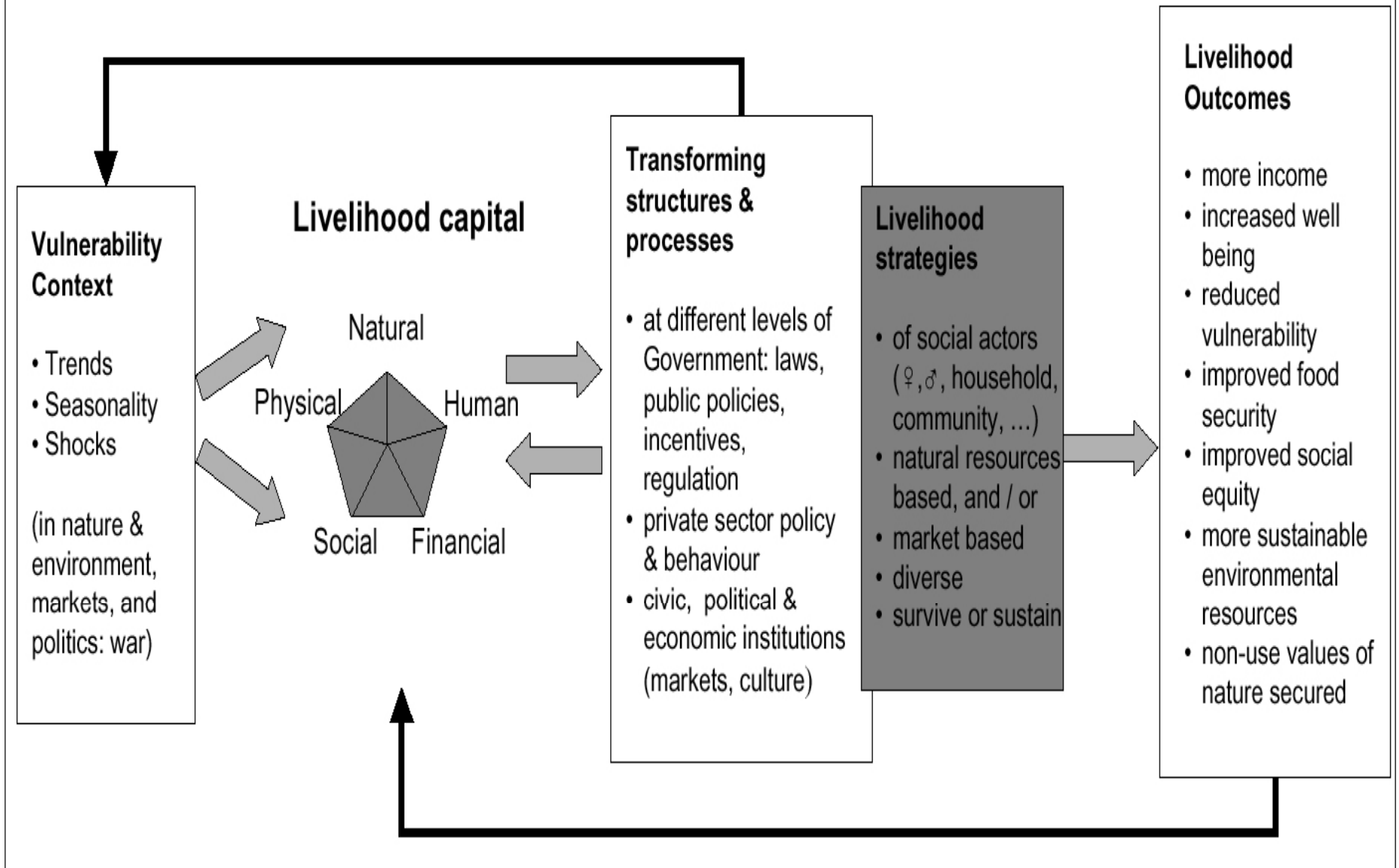


Figure 4 Oxfam's SL framework



The Vulnerability Context

The Vulnerability Context frames the external environment in which people exist. People's livelihoods and the wider availability of assets are fundamentally affected by critical trends as well as shocks and seasonality – over which they have limited or no control.

Trends	Shocks	Seasonality
<ul style="list-style-type: none">• Population Trends• Resource Trends (including conflicts)• National/International Economic Trends• Trends in governance (including politics)• Technological Trends	<ul style="list-style-type: none">• Human Health Shocks• Natural Shocks• Economic Shocks• (Violent) Conflict• Crop/Livestock Health Shocks	<ul style="list-style-type: none">• Of prices• Of production• Of health• Of employment opportunities

Natural Capital

- Examples of natural capital and services derived from it:
 - land
 - forests
 - marine / wild resources
 - air quality
 - erosion protection
 - storm protection
 - bio-diversity
- For all these it is important to consider access and quality and how both are changing.

Physical Capital

The background of the slide is a photograph of a tropical beach. In the foreground, there are several palm trees with their fronds blowing in the wind. In the middle ground, there is a large, light-colored building with a flat roof, possibly a hotel or a resort. The sky is a clear, bright blue, and the ocean is visible in the distance.

- Infrastructure such as roads, rails and telecommunications - are the key to the integration of the remote areas where many of the poor live. Not only are people able to move between rural and urban areas more easily if the transport infrastructure is good, but they are also more likely to be better informed about opportunities (or the lack of them) in areas to which they are thinking of migrating, either temporarily or permanently.

Human Capital

- Human capital represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives.



Social Capital

- Networks and Connectedness, either vertical (patron/client) or horizontal (between individuals with shared interests) that increase people's trust and ability to work together and expand their access to wider institutions, such as political or civic bodies
- Membership of more formalised groups
- Relationships of trust, reciprocity and exchanges

Financial Capital

The background of the slide is a photograph of a tropical beach. In the foreground, there is a thatched roof of a building, likely a beach hut or a traditional house. Several palm trees are visible, some in the mid-ground and some in the background. The sky is a clear, bright blue, and the overall scene is bright and sunny.

- Financial capital denotes the financial resources that people use to achieve their livelihood objectives.
- Available stocks: savings (cash, bank deposit, livestock, jewellery)
- Regular inflow of money: earned income, pensions, other transfers from the state, remittances. The more reliable the less vulnerability.

A tropical beach scene with palm trees and a thatched roof. The image is slightly blurred, suggesting a breeze. The text "Methods, Data and Maps" is overlaid in the center.

Methods, Data and Maps

Approaches to Vulnerability Assessment

- Community case studies
 - interviews, ethnography, observation
- Socioeconomic data analysis
 - population and agricultural census
 - annual statistical reports (health, crop, water)
 - questionnaire surveys
- Historical narratives
- Mapping
- Modeling

ROOT CAUSES

Limited access to
? Power
? Structures
? Resources

Ideologies
? Political systems
? Economic systems

1

DYNAMIC PRESSURES

Lack of
? Lack of local institutions
? Training
? Appropriate skills
? Local investments
? Local markets
? Press freedom
? Ethical standards in public life

Macro Forces
? Pop growth
? Urbanization
? Arms expenditure
? Debt repayment
? Deforestation

2

UNSAFE CONDITIONS

Fragile physical environment
? Dangerous locations
? Unprotected building / infrastructure

Fragile local economy
? Livelihoods at risk
? Low income

Vulnerable society
? Special groups at risk
? Lack of local institutions

Public actions
? Lack of disaster preparedness
? Prevalence of endemic disease

3

DISASTER

RISK = Hazard + Vulnerability

HAZARDS

Flooding
Landslide
Drought
Drought
Earthquake
Virus and pests
High winds
Volcanic eruption

The progression of vulnerability

Figure 4 – The pressure and release model of Blaikie *et al* (1994)

A mathematical expression for risk in terms of hazards and vulnerabilities is represented as follows:

$$\text{Risk} = \text{Hazard} \square \text{Vulnerability} \quad [1]$$

where \square represents the function that describes the combination between the hazard and the vulnerability. An example of such a function is the simple product, as proposed by ISDR (2004):

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability} \quad [2]$$

Alexander (2000: 10) defines **risk** as “the likelihood, or more formally the probability, that a particular level of loss will be sustained by a given series of elements as a result of a given level of hazard.” **Total risk** would then consist of the sum of predictable casualties, damages and losses, represented via the equation:

$$\text{Total Risk} = (\Sigma \text{ elements at risk}) \times \text{Hazard} \times \text{Vulnerability} \quad [3]$$

Recent publications define risk incorporating such terms as *Coping Capacity*, *Exposure*, and *Deficiencies in Preparedness*. For example, one typical relation employed by many agencies is:

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Coping Capacity}} \quad [4]$$

In this context, **Coping Capacities** refer to the means by which people or organisations use available resources and capacities to face adverse consequences related to a disaster. In general, such capacities involve management of resources before, during, and after the disaster.

An interesting formulation concerning vulnerability has been proposed by *Disaster Reduction Institute* (DRI) in a report to the *Department For International Development* (DFID) of England (White et al., 2005). In this formulation, vulnerability itself is seen as a combination of *Exposure*, *Susceptibility*, and *Coping Capacity*:

$$\text{Vulnerability} = \frac{\text{Exposure} \times \text{Susceptibility}}{\text{Coping Capacity}} \quad [5]$$

In contrast to the three previous models, the author has defined the following relation for risk (Villagrán, 2001):

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability} \times \text{Deficiencies in Preparedness} \quad [6]$$

In this relation, **Deficiencies in Preparedness** refer to those pre-existing conditions which inhibit an institution, a community, a society, or a country to respond in an effective and opportune fashion once the event is triggering the disaster to minimize its impacts, in particular the loss of lives. Such deficiencies would include the lack of emergency committees and emergency plans, the lack of early warning systems, and related measures.

Dilley et al. (2005) as well as other authors represent risk as the combination of three components: *hazard*, *exposure*, and *vulnerability*. In this context vulnerability is an intrinsic characteristic of people, infrastructure, economically and environmentally important land uses while the hazard is related to magnitude, duration, location, and timing of the event. In this case, the relation between risk, hazard, vulnerability, and exposure is represented as follows:

$$\text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability} \quad [7]$$

Hahn (2003), using the terms hazard, vulnerability, exposure, and coping capacities has developed a model in which risk is represented via the formula:

$$\text{Risk} = \text{Hazard} + \text{Exposure} + \text{Vulnerability} - \text{Coping Capacities} \quad [8]$$

Regardless of the model employed to represent risk, the end result should be the same. As expressed by ISDR.

Risk should represent the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions (ISDR, 2004:16).

Vulnerability (V) = f (Exposure, Resilience)

There is V, if {External **Exposure**} –
{Internal **Coping + Adaptation**} > 0

- Biophysical vulnerability - dry or extreme climate, steep slopes, floodplain, soil types, land use changes, pests and diseases
- Socio-economic Vulnerability - poverty, lack of access to credit, information or technology, gender, age, race, nutritional or educational status, political power, structural (e.g. legal, institutional constraints,..)
- Vulnerability in geographical (where people are located) and social (who in the place) space.

Methodology for Vulnerability Assessment

- **Vulnerability Mapping and Data**
 - **A. De-segregating Existing Data on Socio-Economic Groups**
 - **B. Undertaking New Statistical Surveys to Collect Data Directly Relevant to Vulnerability**
 - **C. Using Existing Data as Key Indicators of Vulnerability**
 - **D. Rapid Rural Appraisal Methods**

A. Desegregating Existing Data on Socio-Economic Groups

- Vulnerability rarely is directly measured in national data sets such as censuses and income and expenditure surveys.
- One approach to mapping vulnerability has been to take poverty as a proxy indicator of vulnerability. This generally involves the selection of socio-economic groups judged to be vulnerable and then the estimation of the numbers within each group by geographical region, so that maps can then be prepared showing the regional distribution of "vulnerable" groups.
- This method can be characterized as a "top - down" approach as it relies heavily on the geographical desegregation of national data sets.

Census data and mapping

- Typical census variables

- Population

- personal socioeconomic (age, education, migration, income, occupation,.....)
 - household (number of residents, rooms, material, water and sanitation, ownership,...)

- Agricultural

- landholding size and tenure
 - land use and irrigation
 - crop and livestock types and production
 - use of technology and labor
 - income and prices
 - losses and insurance

Which of these can be used as direct or indirect measures of vulnerability ?

B. Undertaking New Surveys Using Formal Survey Techniques to Collect Data More Directly Relevant to Vulnerability.

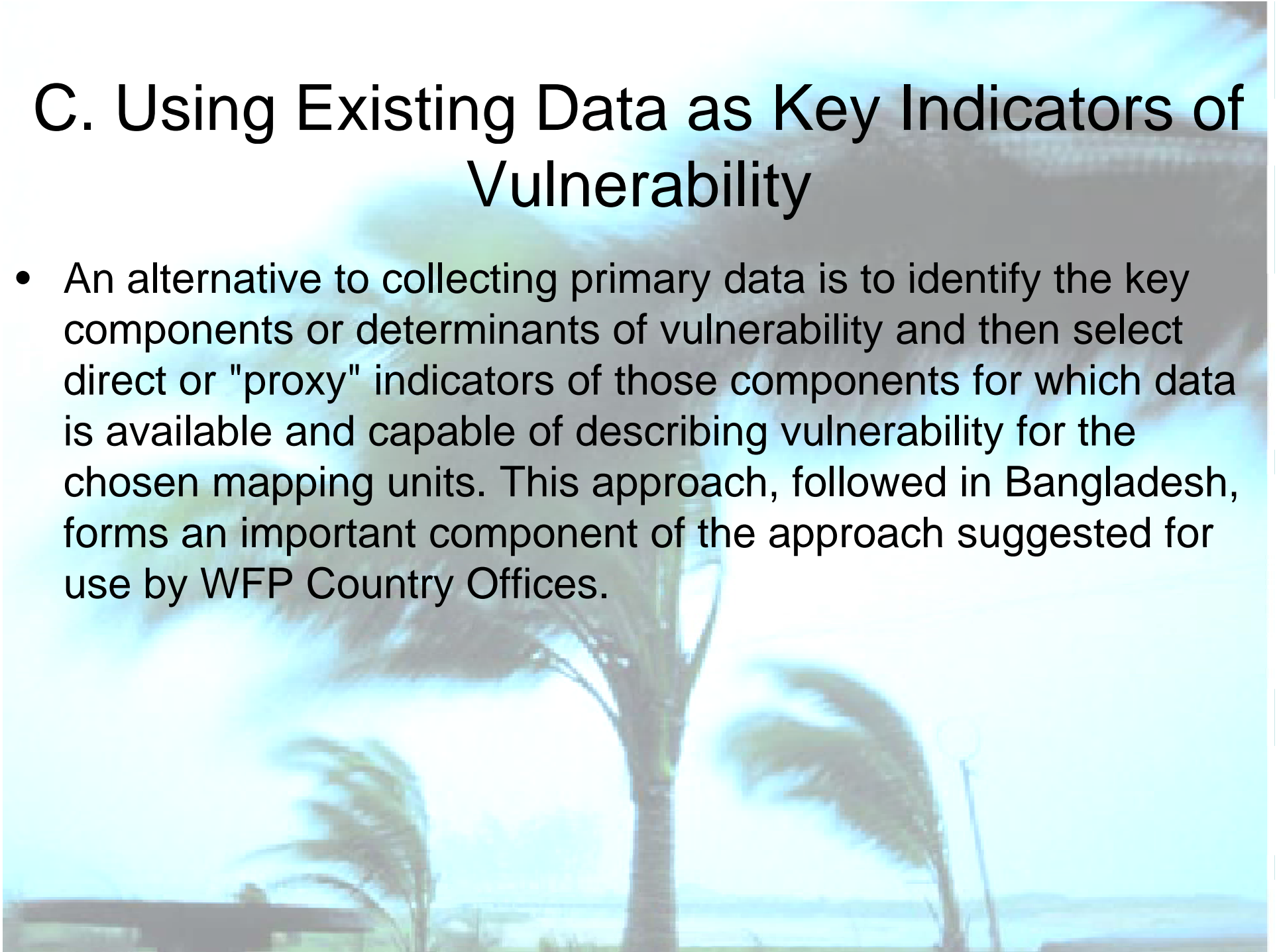
- An alternative to the lack of data directly related to all components of vulnerability is to carry out surveys using formal survey techniques which collect information more directly related to vulnerability. This approach is often used by relief agencies as part of their monitoring and targeting activities during large-scale relief operations.
- E.g. during the response by the international community to the African Food Crisis of the mid-1980's western Non-Governmental Organizations (NGOs) carried out extensive household surveys which attempted to assess the need for food aid at the household and community level.

B. Undertaking New Surveys Using Formal Survey Techniques to Collect Data More Directly Relevant to Vulnerability (Cont.)

- Many of the surveys incorporated the notion of coping strategies and the level of entitlement. Some even carried out mini-censuses to compensate for the inaccurate census information available.
- Whilst this approach is potentially the most effective for gathering data which could be used to map vulnerability, it is in most cases beyond available resources.

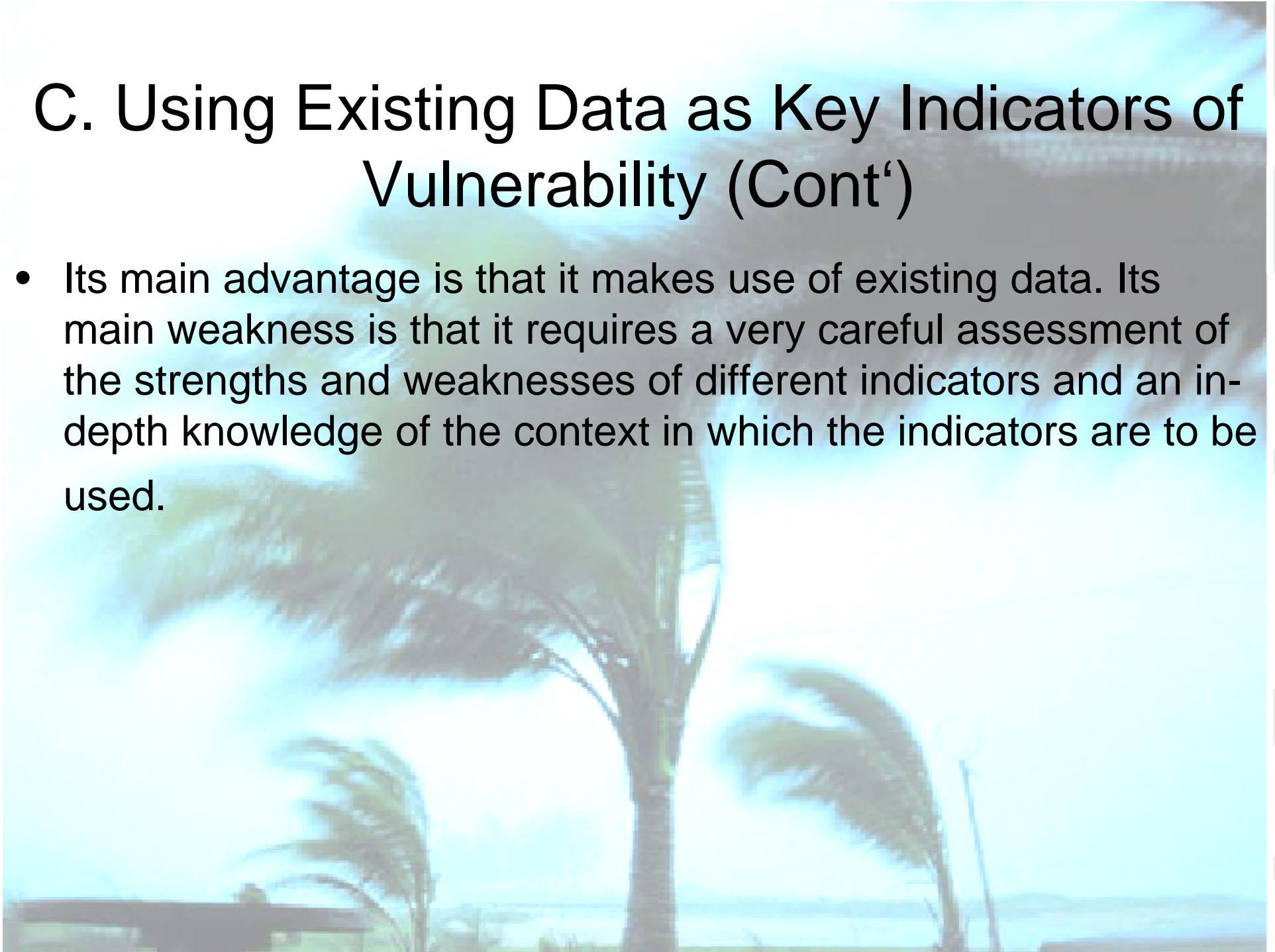
C. Using Existing Data as Key Indicators of Vulnerability

- An alternative to collecting primary data is to identify the key components or determinants of vulnerability and then select direct or "proxy" indicators of those components for which data is available and capable of describing vulnerability for the chosen mapping units. This approach, followed in Bangladesh, forms an important component of the approach suggested for use by WFP Country Offices.



C. Using Existing Data as Key Indicators of Vulnerability (Cont')

- Its main advantage is that it makes use of existing data. Its main weakness is that it requires a very careful assessment of the strengths and weaknesses of different indicators and an in-depth knowledge of the context in which the indicators are to be used.



D. Rapid Rural Appraisal Methods

- In situations where data that might be used to indicate vulnerability is not available or of poor quality, one option is to collect the information required through specially organized surveys.
- Resource and time limitations place a premium on survey techniques which can be carried out more quickly and at lower cost than large statistical surveys.
- Since the late 1970's a number of techniques have been developed under the heading Rapid Rural Appraisal (RRA) which enable surveys to be carried out comparatively quickly and inexpensively. Central to the RRA approach is the use of multi-disciplinary teams and the utilization of the knowledge and experience of local communities.

D. Rapid Rural Appraisal Methods

- A recent attempt to utilize the RRA approach in assessing the provincial distribution of groups vulnerable to food insecurity was that devised for the Sudan. This involved "Rapid Food Security Assessments" being carried out in nine communities in different parts of the country.
- The approach saw food insecurity as being composed of three dimensions: poverty, vulnerability and malnutrition.



D. Rapid Rural Appraisal Methods

- Based on the results of the assessments in the nine communities, seven main groups of food insecure were identified:
 - i. the working poor in urban areas;**
 - ii. female headed households in urban areas (largely a sub-group of i);**
 - iii. the disabled or handicapped in urban areas;**
 - iv. resource-poor families in rural areas;**
 - v. female headed households in rural areas (largely a sub-group of iv);**
 - vi. people not belonging to iv) or v) but who live in marginal areas;**
 - vii. poor nomads**

Indices of Vulnerability (examples)

- Global, National, Sub-National, Local
- Sea level rise - population living below 1m above sea level
- Food Security - nutritional status, available income, aid
- Physical quality of life index (PQLI) - life expectancy, infant mortality, literacy
- Food balance sheets and debt/service ratio
- Environmental Hazard Risk Indices

Indicators should be.....

- Readily available (i.e. to be derived from existing data)
- Available for all countries
- Cheap and easy to get
- Should cover external as well as internal side of vulnerability

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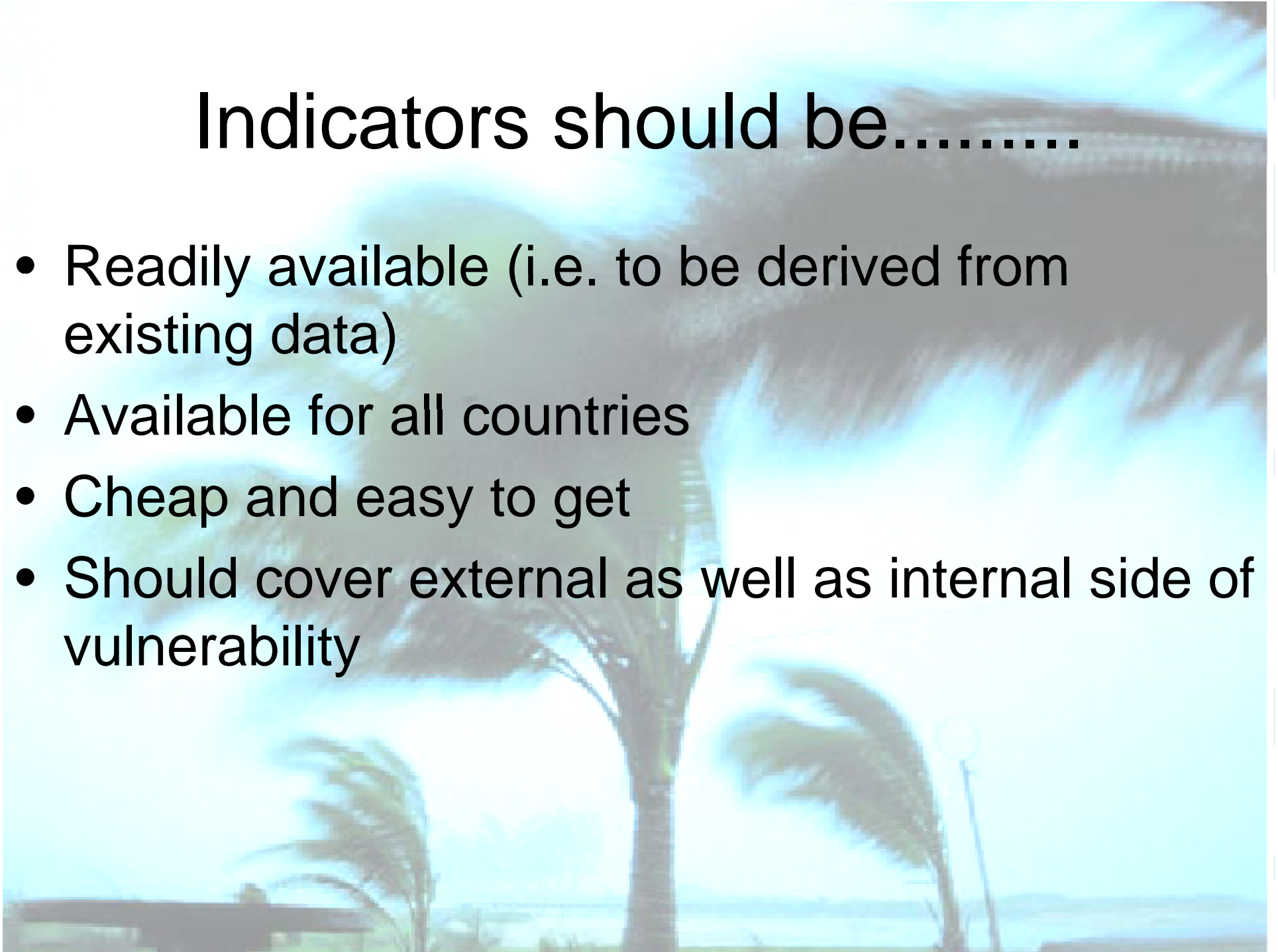
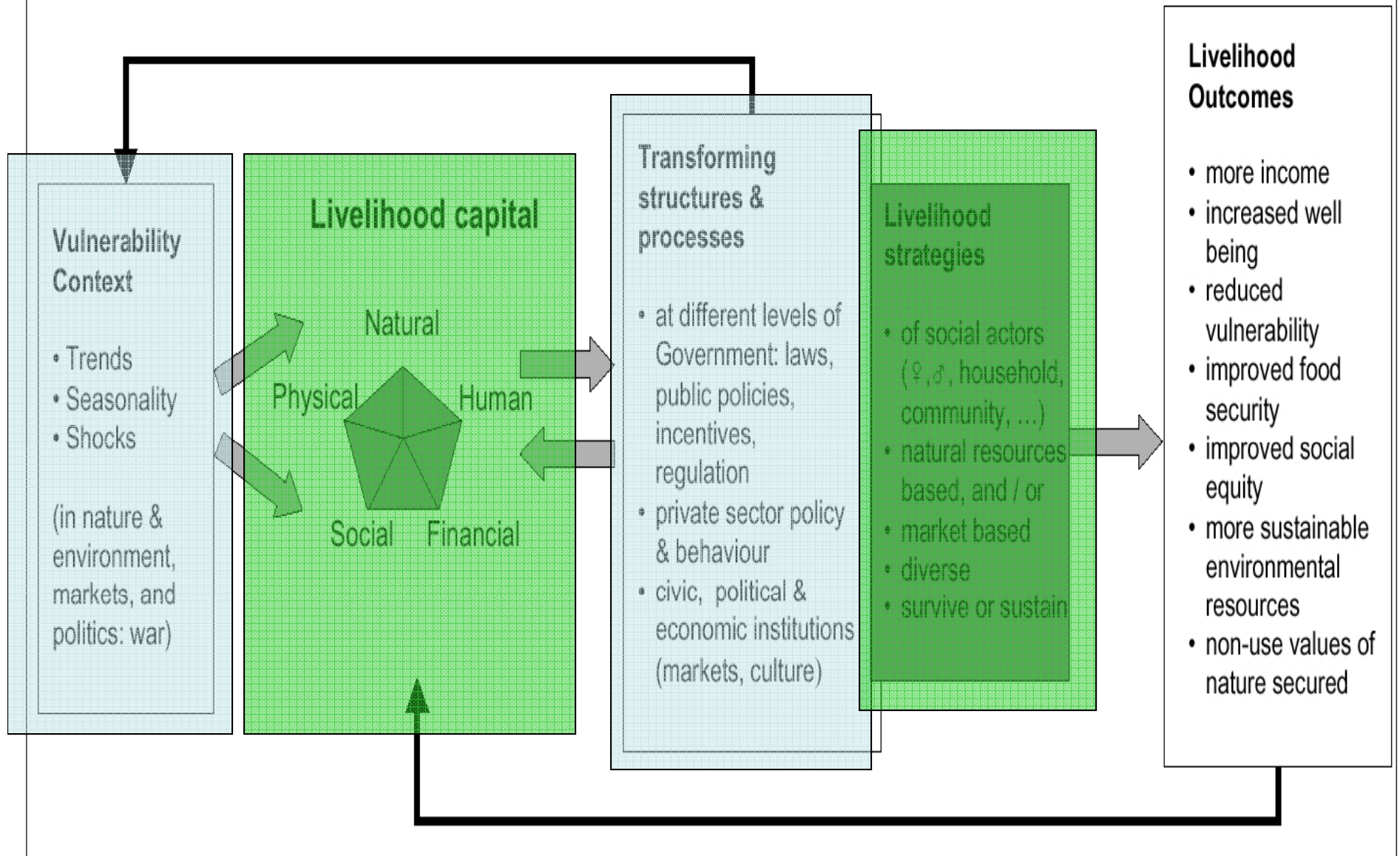
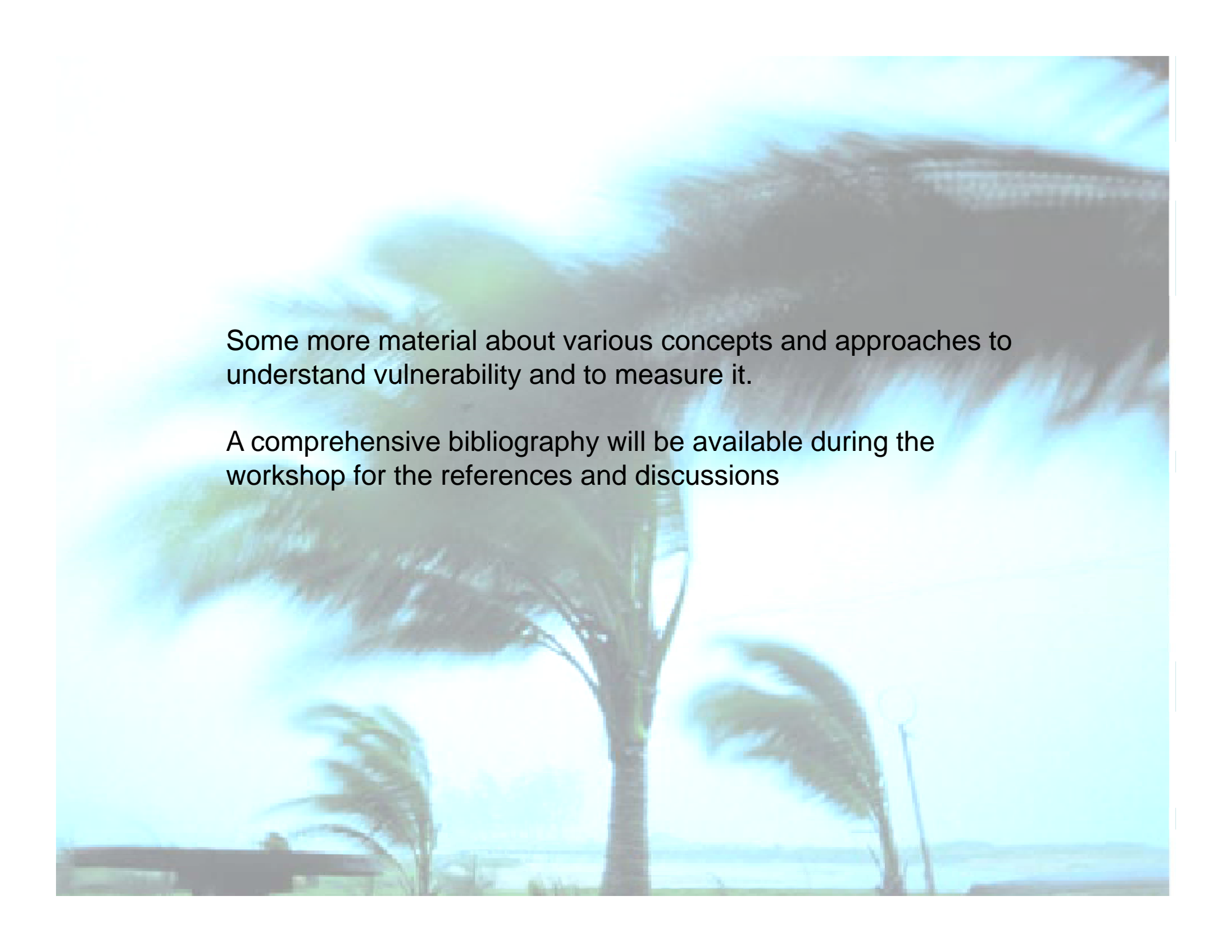


Figure 4 Oxfam's SL framework



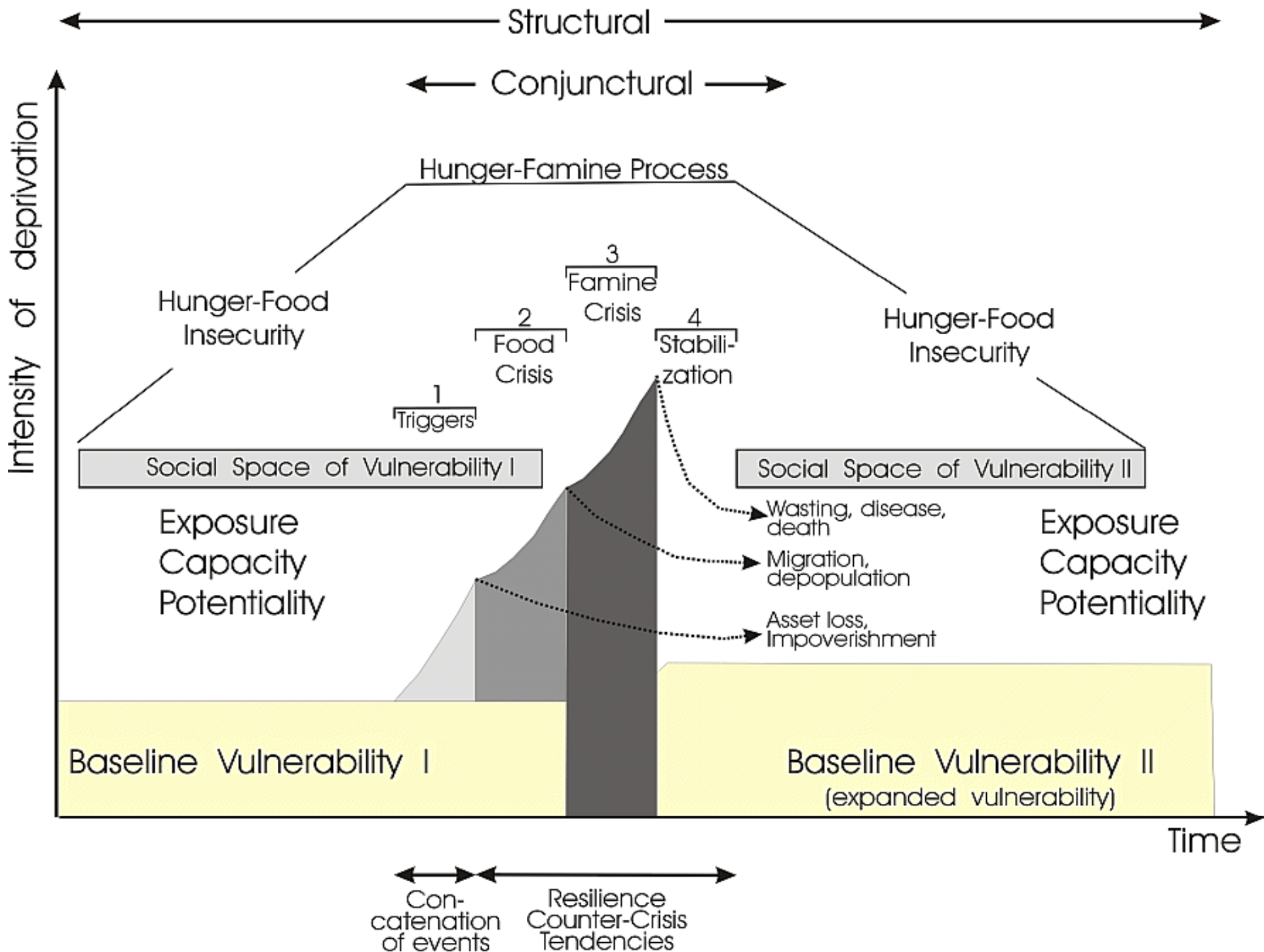
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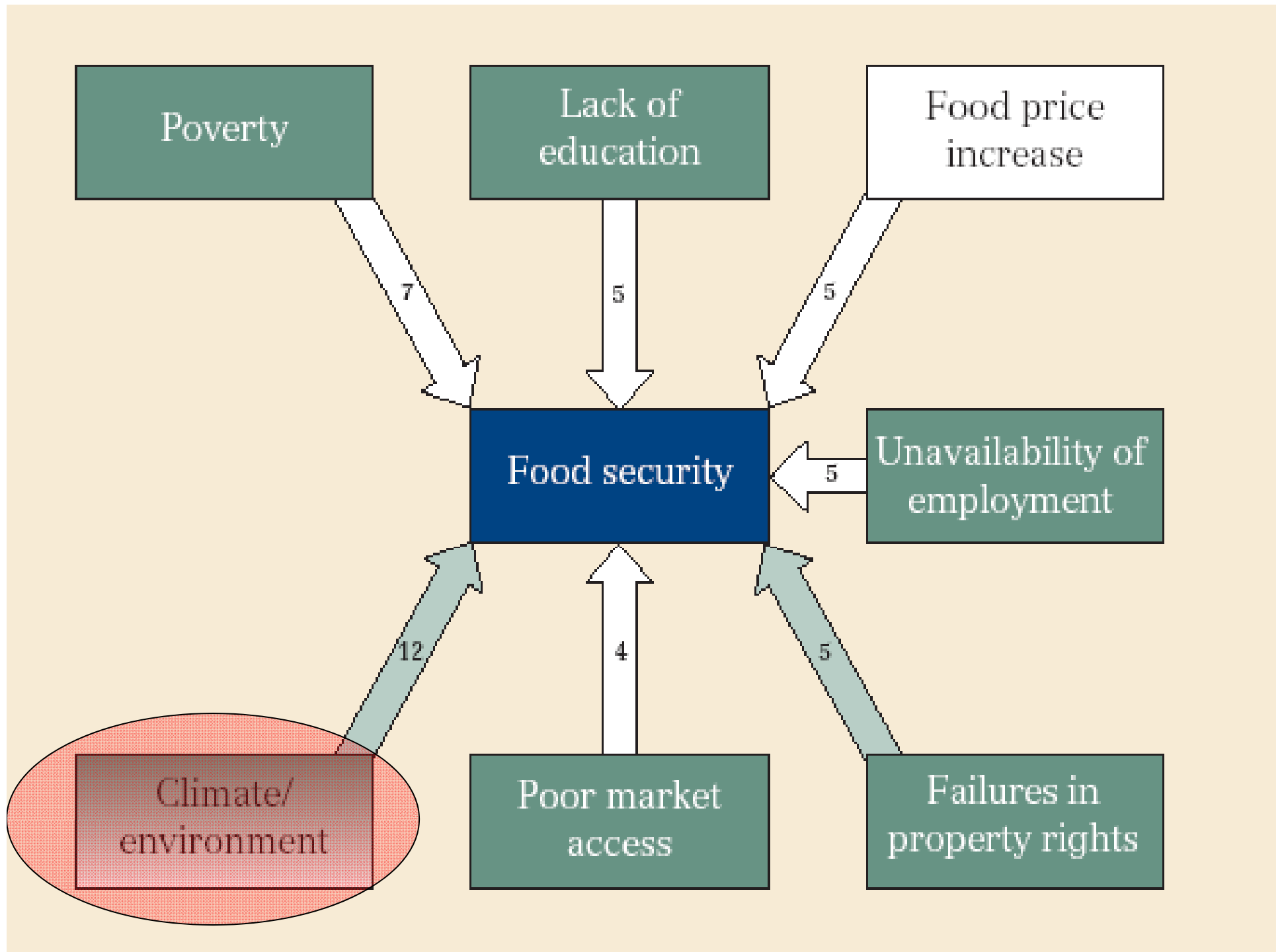


A tropical beach scene with palm trees and a thatched roof. The image is slightly blurred, suggesting a breeze. The sky is a clear, pale blue. In the foreground, the dark, textured thatched roof of a building is visible on the right side. Several palm trees of varying heights are scattered across the middle ground, their fronds swaying. In the background, a calm body of water meets a distant, hazy shoreline under a bright sky.

Some more material about various concepts and approaches to understand vulnerability and to measure it.

A comprehensive bibliography will be available during the workshop for the references and discussions





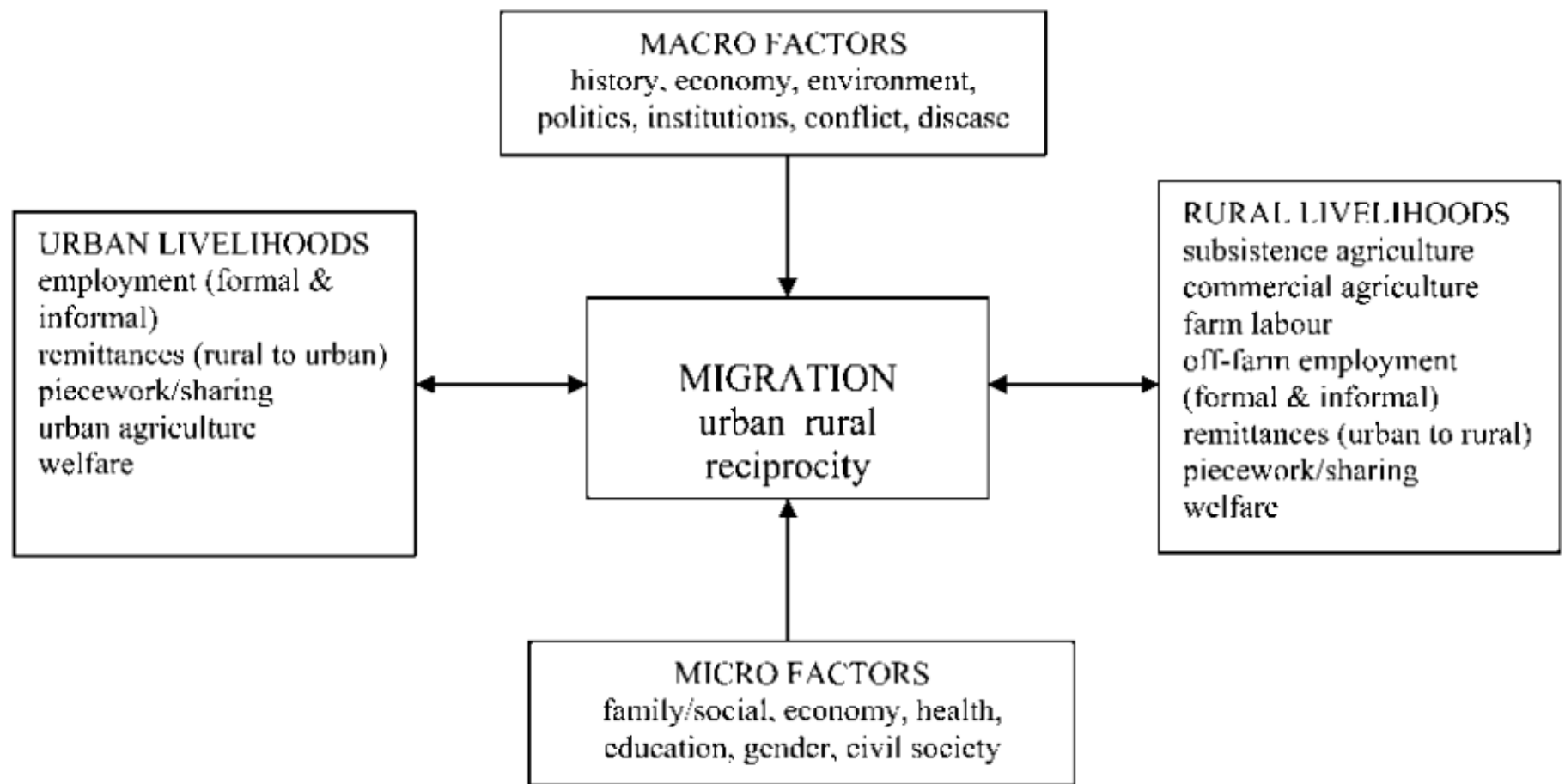
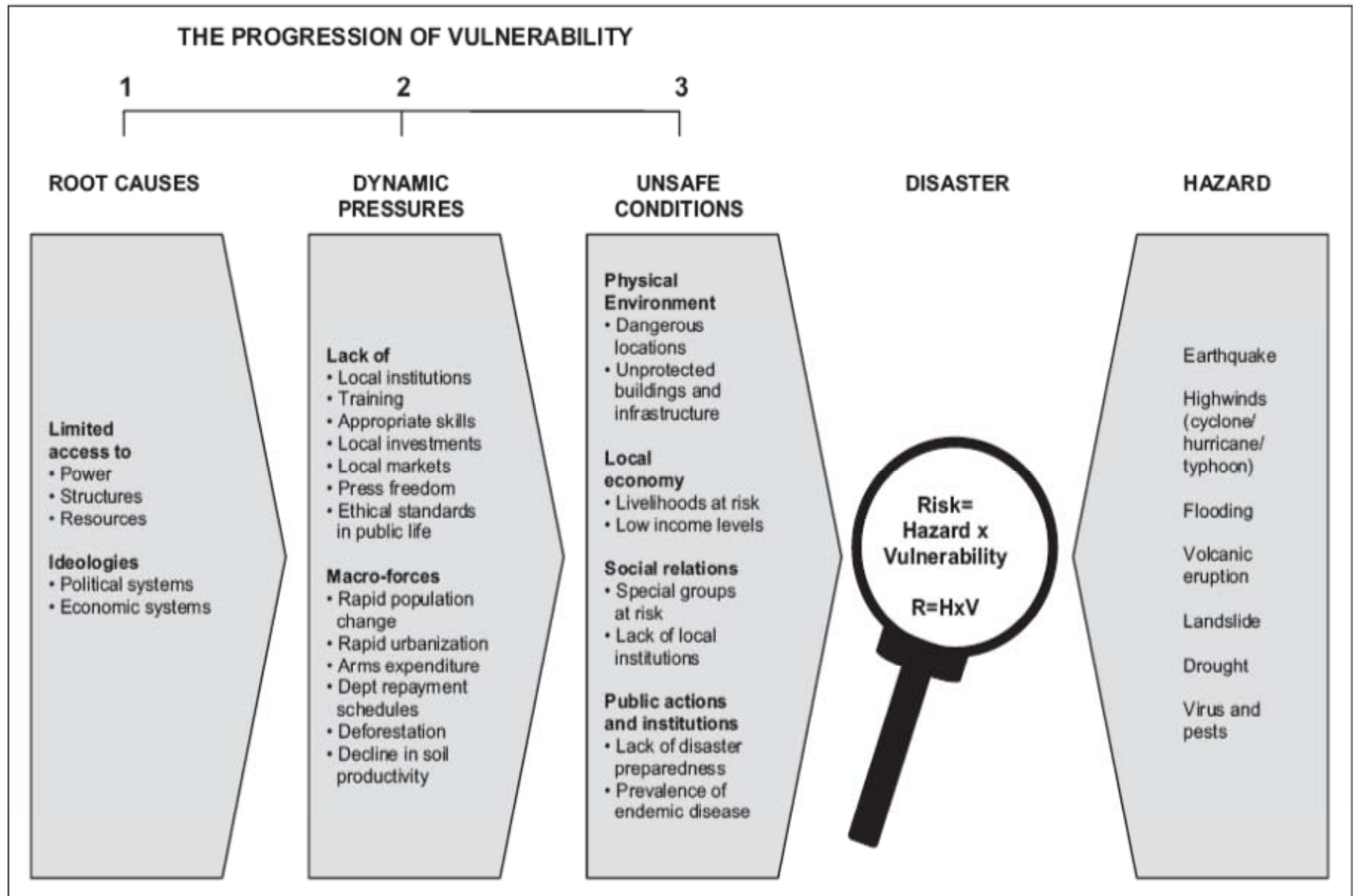


Figure 1: Conceptual framework – reciprocal migration and livelihoods



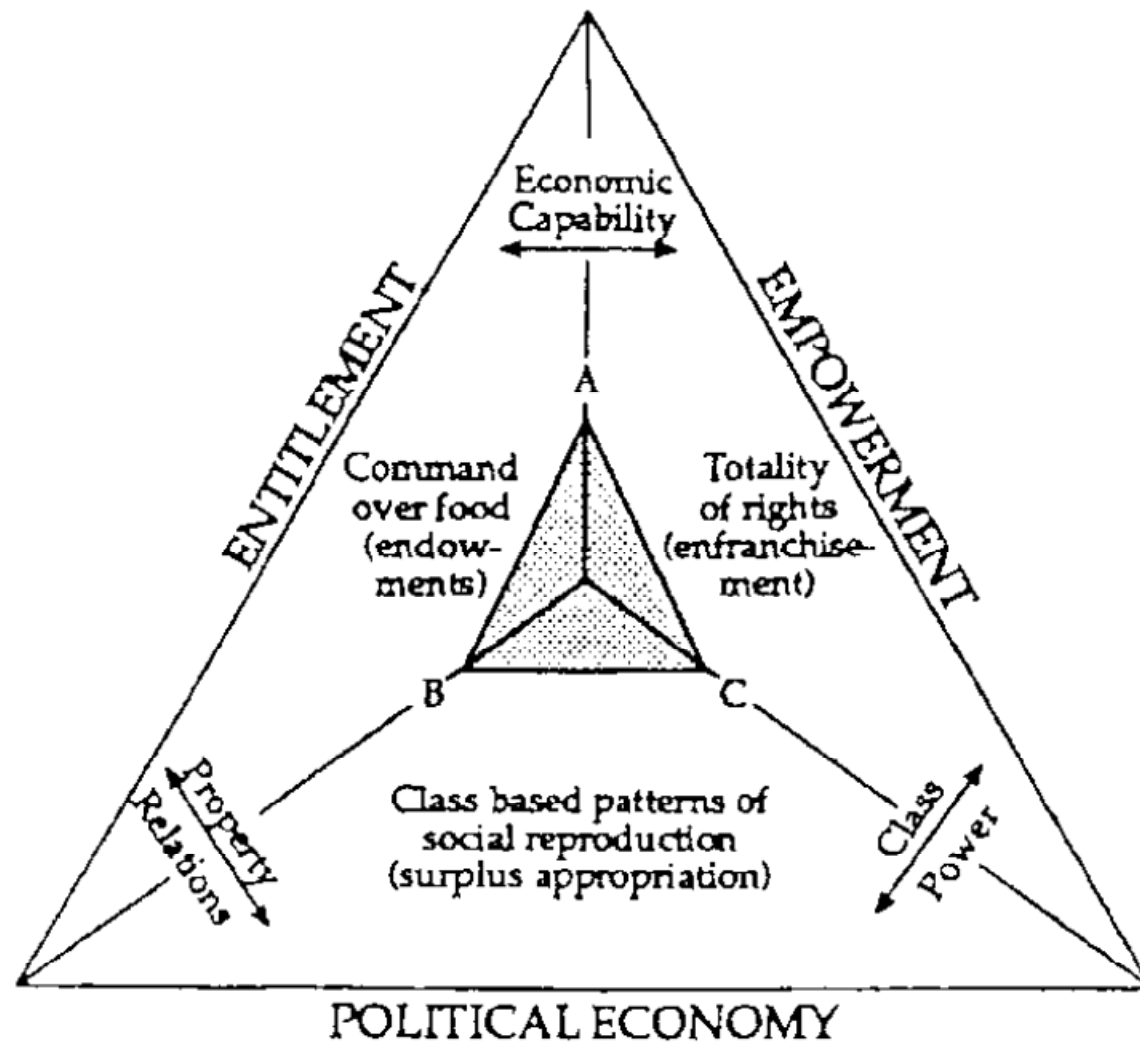
Figure 11: The Pressure and Release (PAR) Model: the Progression of Vulnerability

(Wisner et al. 2004:51)



- Thank you very much

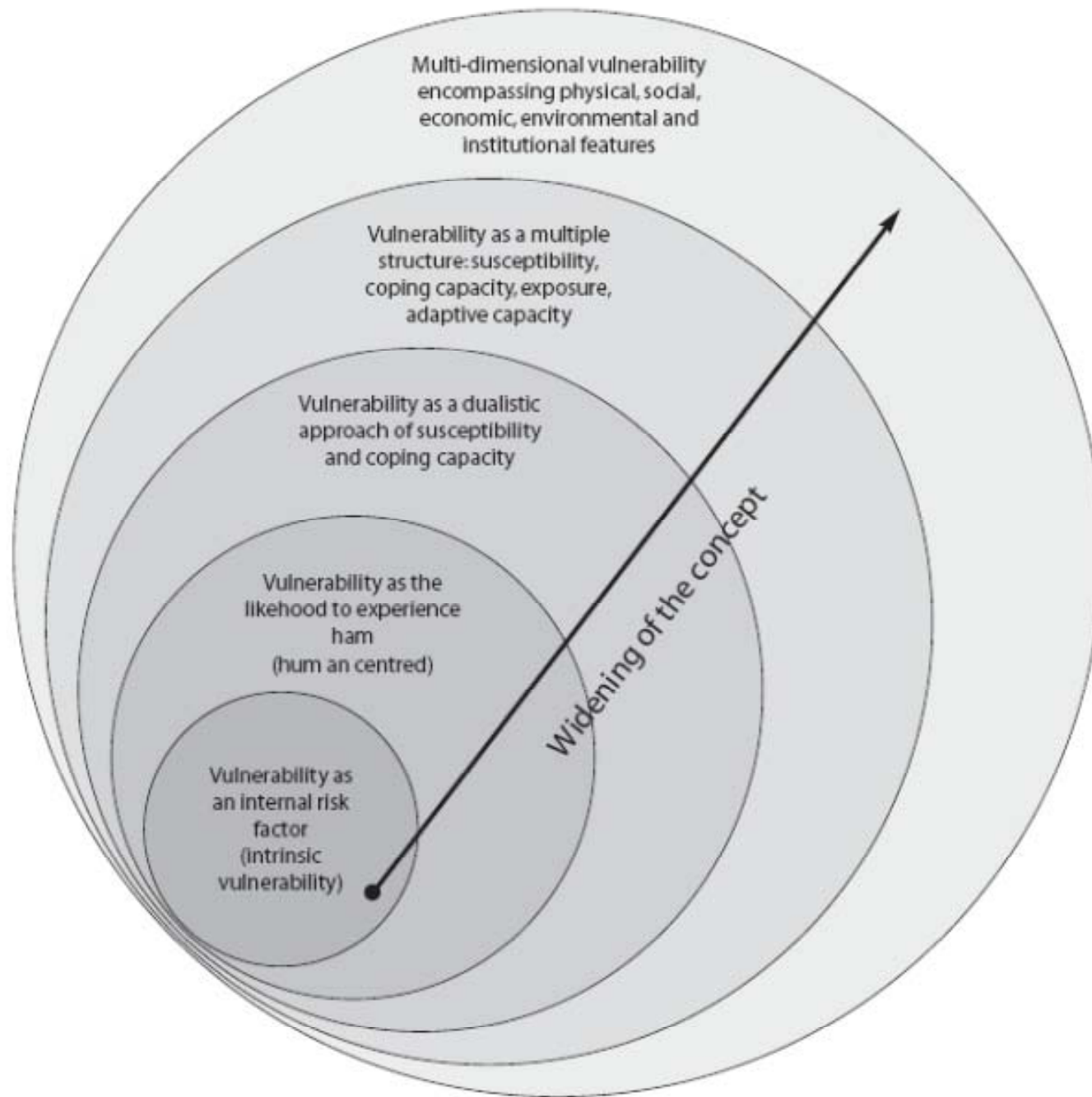




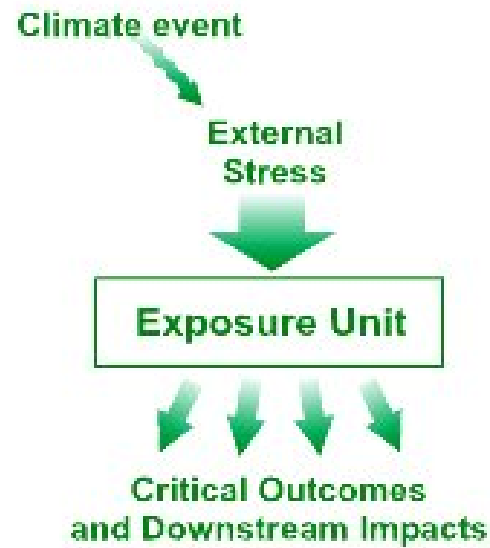
- △ Space of Vulnerability
- A Vulnerability by lack of POTENTIALITY
- B Vulnerability by EXPOSURE
- C Vulnerability by lack of CAPACITY

Fig. 2. The causal structure of vulnerability (source: Watts & Bohle 1993).

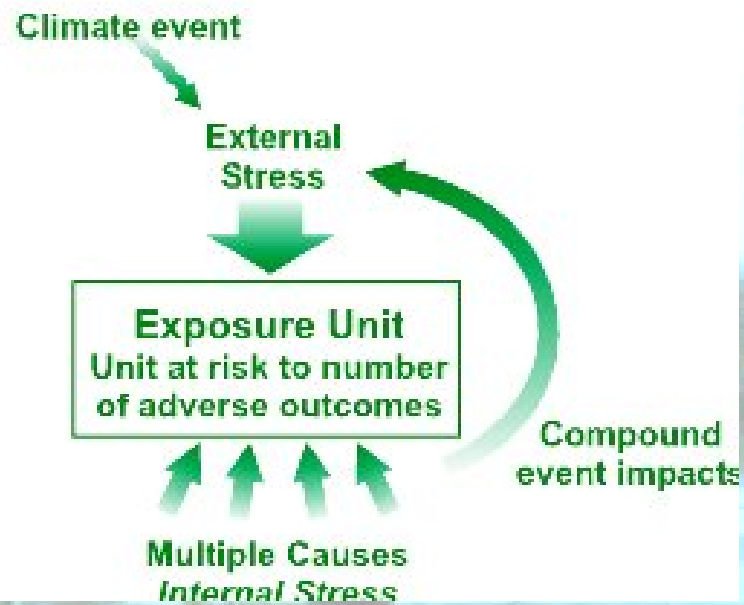
Figure 1: Key Spheres of the Concept of Vulnerability (Birkmann 2006)



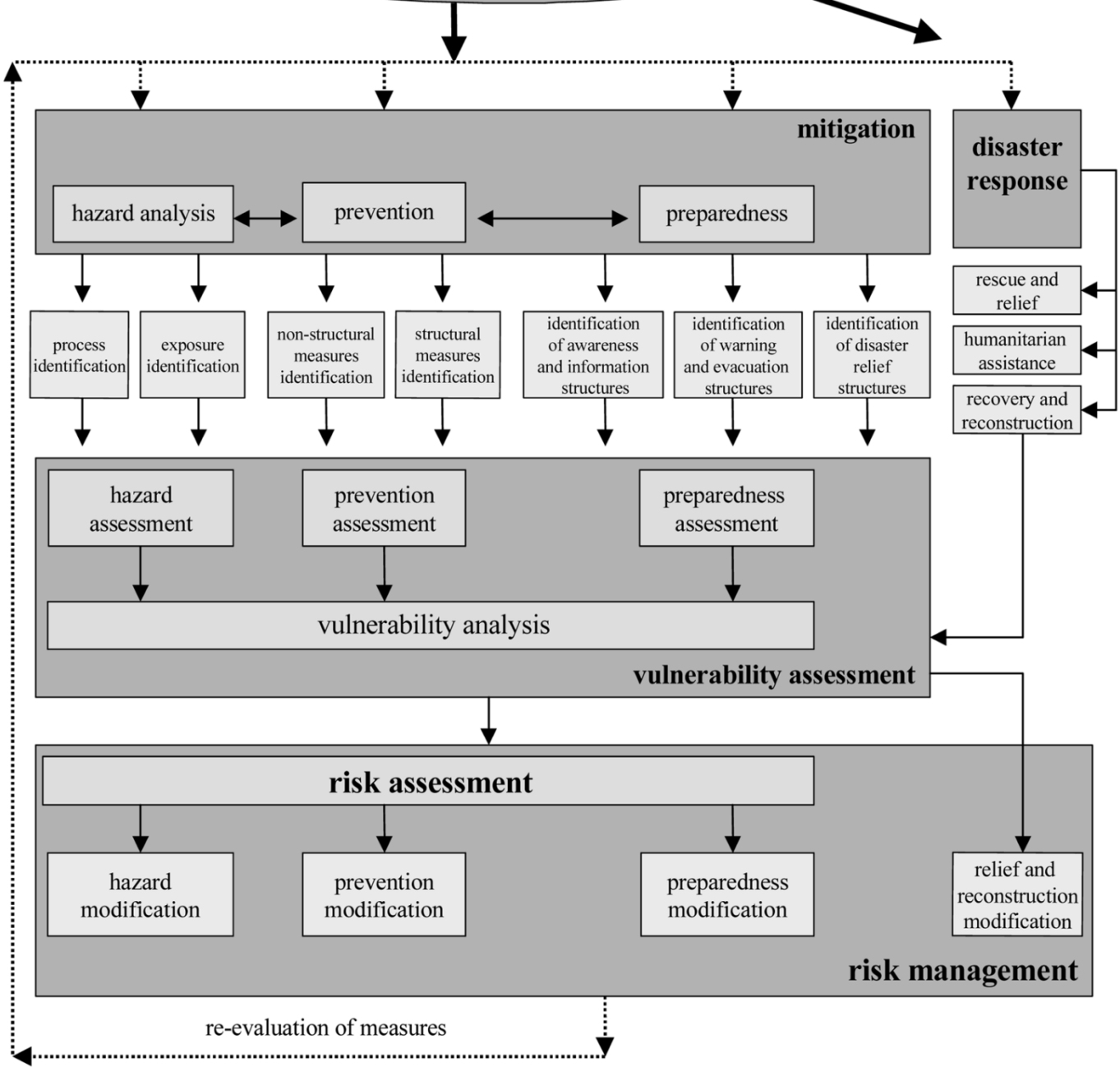
a) Impact Assessments



b) Vulnerability Assessments

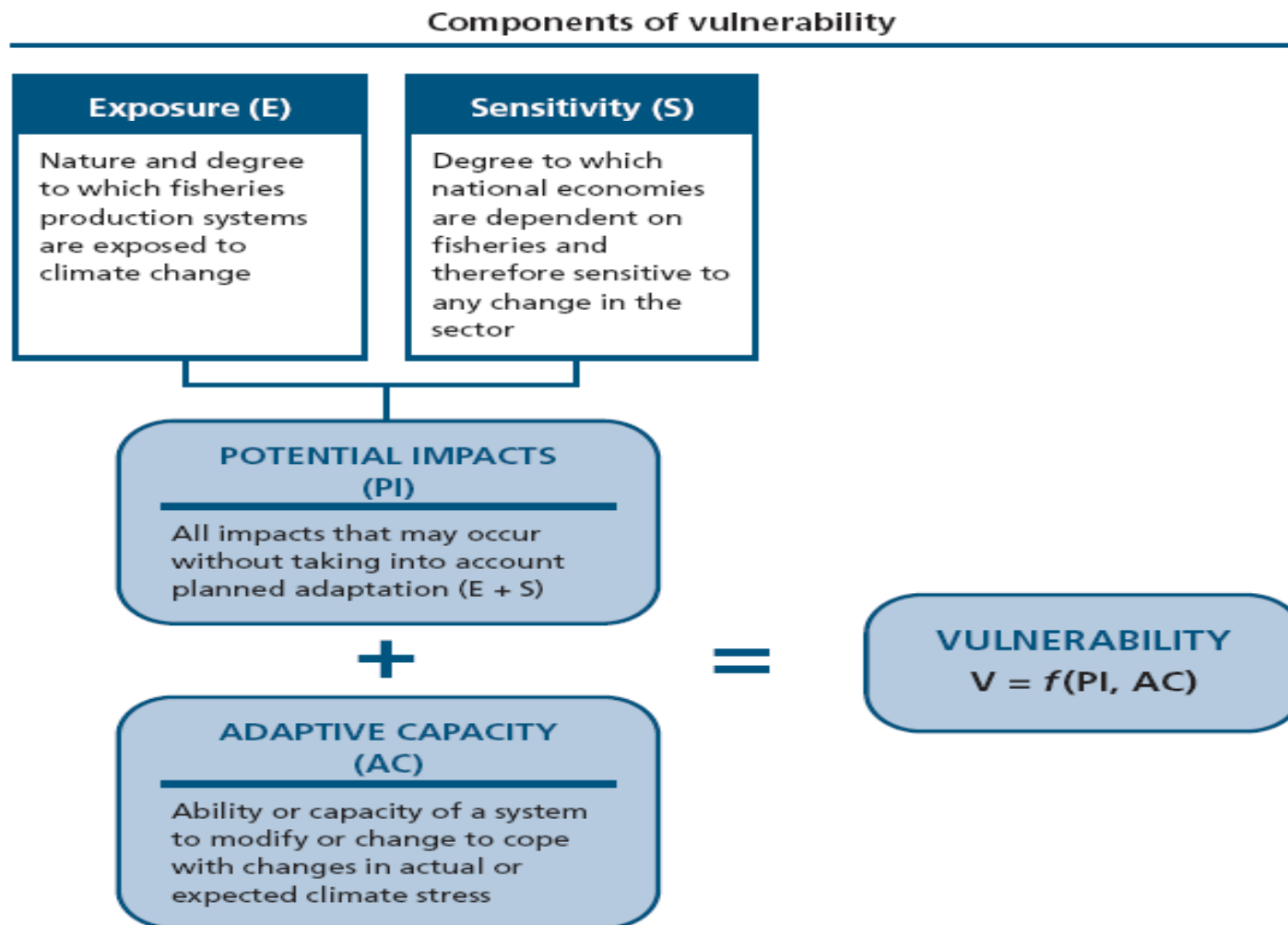


disaster management



Components of vulnerability

The factors that determine the vulnerability of fisheries-dependent and aquaculture-dependent communities can be summarized thus:



Source: FAO. 2007. *Building adaptive capacity to climate change. Policies to sustain livelihoods and fisheries*. New Directions in Fisheries. A Series of Policy Briefs on Development Issues. No. 08. Rome.

Components of Food Security & Key Elements

FOOD UTILISATION

- *Nutritional Value*
- *Social Value*
- *Food Safety*

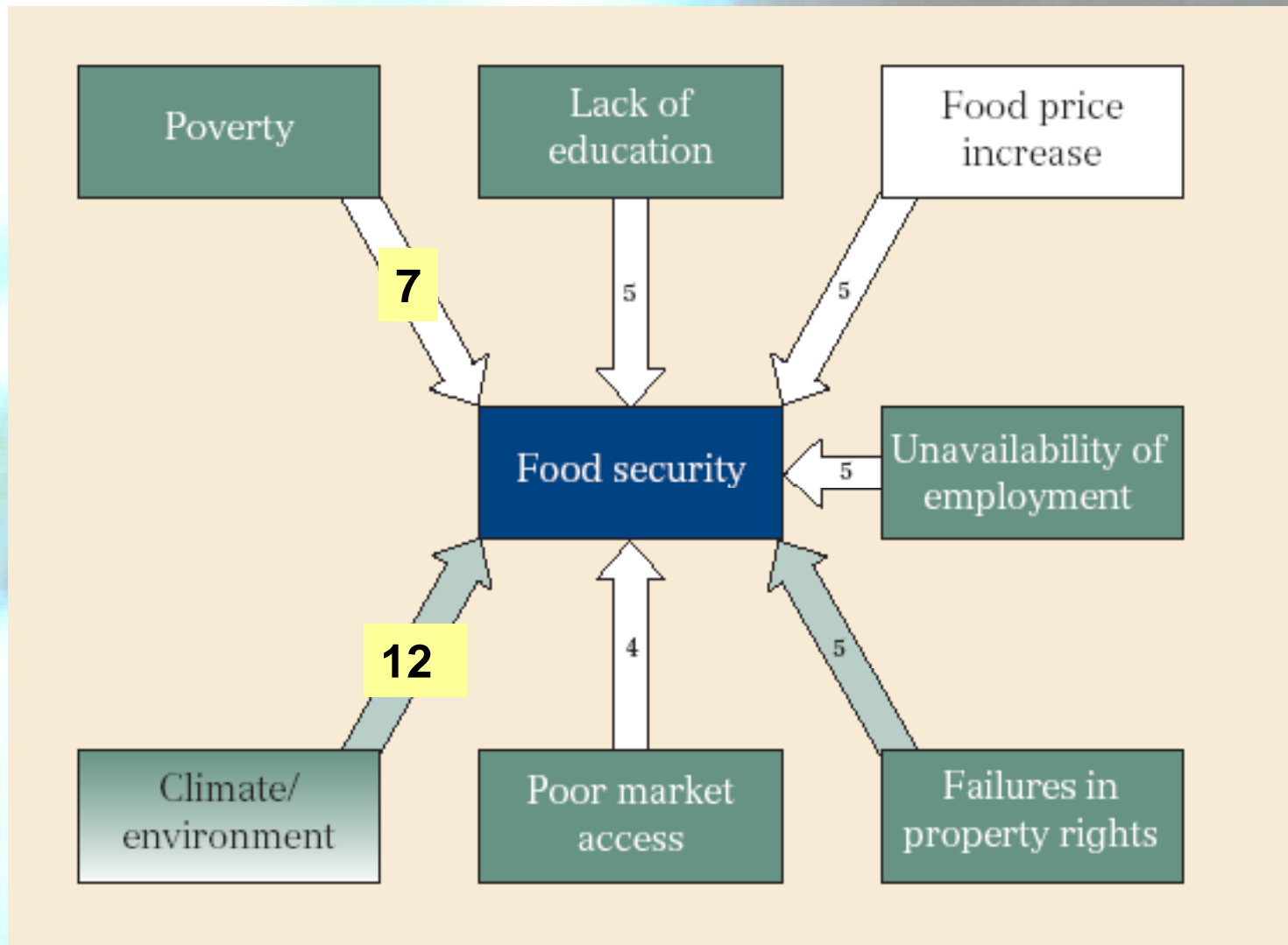
FOOD ACCESS

- *Affordability*
- *Allocation*
- *Preference*

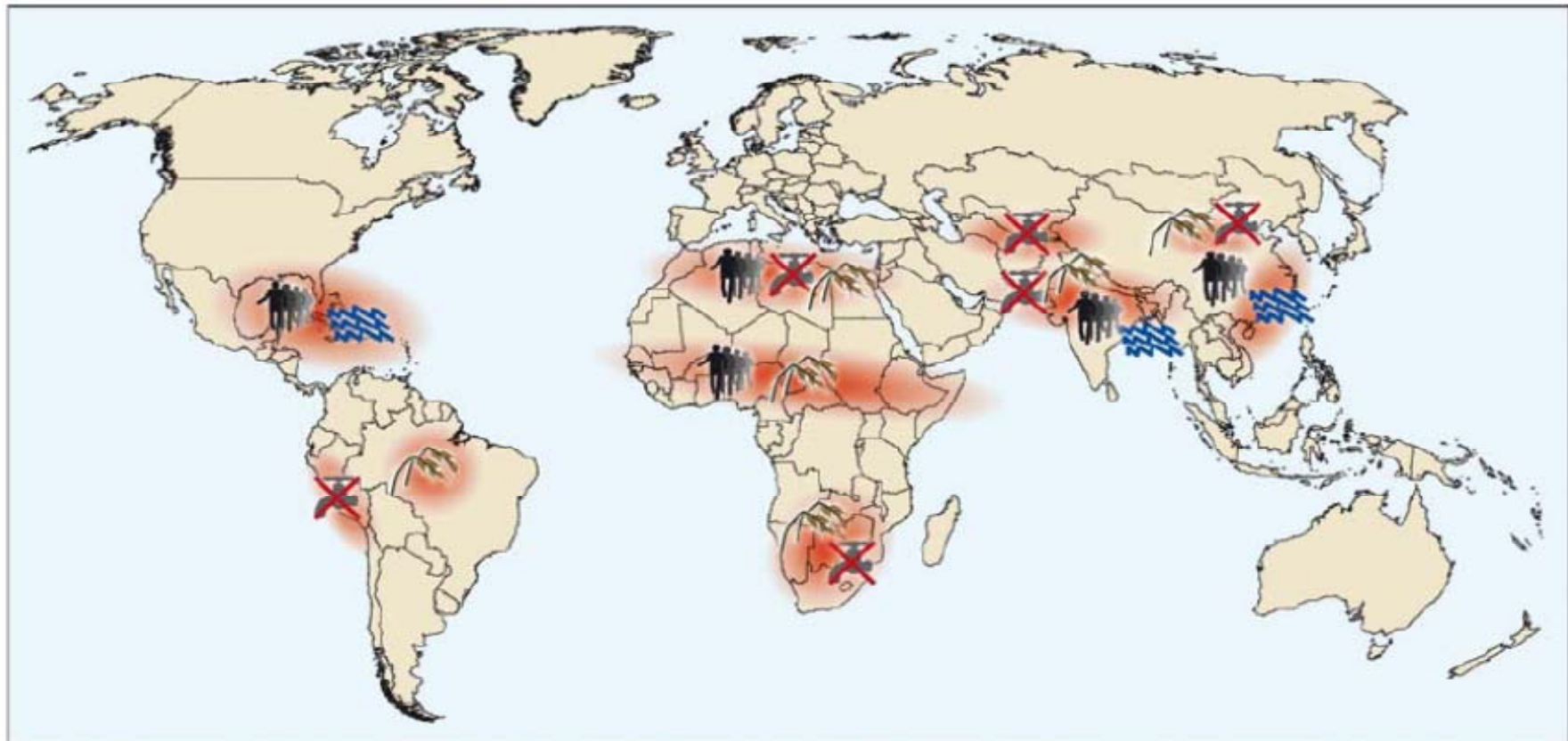
FOOD AVAILABILITY

- *Production*
- *Distribution*
- *Exchange*

Food insecurity arises from overlapping and interacting stressors



A Map of Migration Induced by Environmental Stressors



Conflict constellations in selected hotspots



Climate-induced degradation of freshwater resources



Climate-induced decline in food production



Hotspot

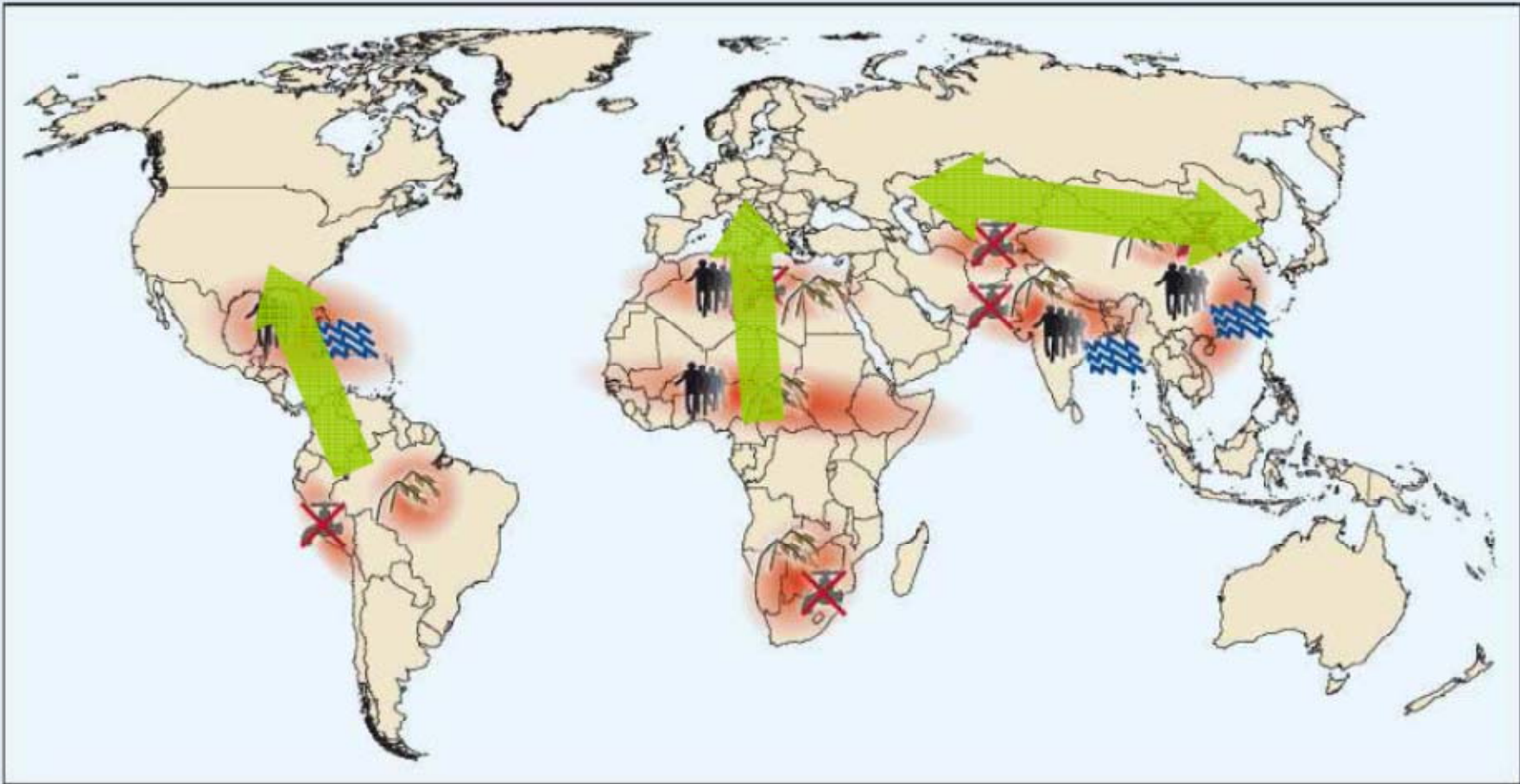


Climate-induced increase in storm and flood disasters



Environmentally-induced migration

Source: German Advisory Council on Global Change WBGU (2007): Climate Change as a Security Risk



Conflict constellations in selected hotspots



Climate-induced degradation of freshwater resources



Climate-induced decline in food production



Hotspot



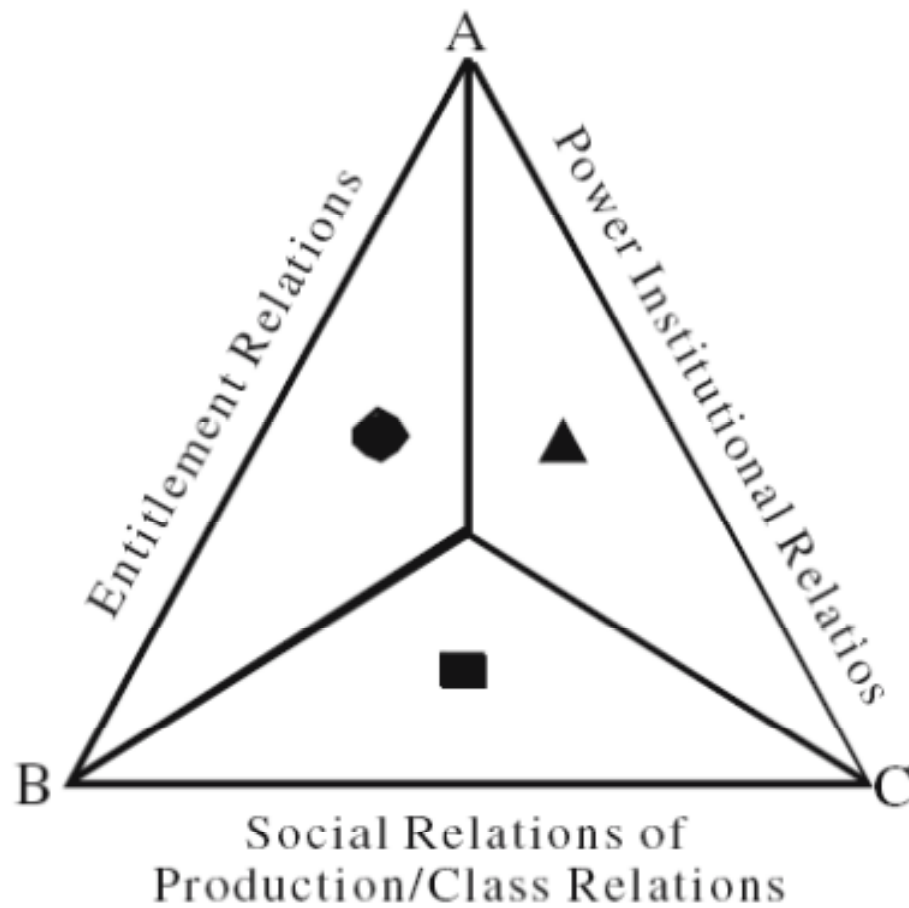
Climate-induced increase in storm and flood disasters



Environmentally-induced migration



Main trajectories



- Vulnerability as Entitlement Problem
- ▲ Vulnerability as Powerlessness
- Vulnerability through Appropriation and Exploitation

Figure 2. 'Space of vulnerability.' Adapted from Watts and Bohle (1993).

Figure 14: States and Scenarios for Transition

(Ivanov 2005)

