Flood Vulnerability Index

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Background of the Study

Climate Change → **Increasing Impatcs**

Source: AP

Source: AP

Source: http://www.qsr.mlit.go.jp/bousai/index_c19.html

Background of the Study

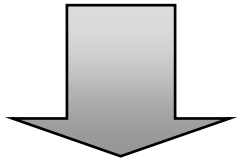
New Orleans, USA
Aug. '05

Source: US Army Corps of Engineers

Purpose of the study

Purpose:

Flood Vulnerability Index (FVI) enables everyone to assess vulnerability to flood disaster at basin level.



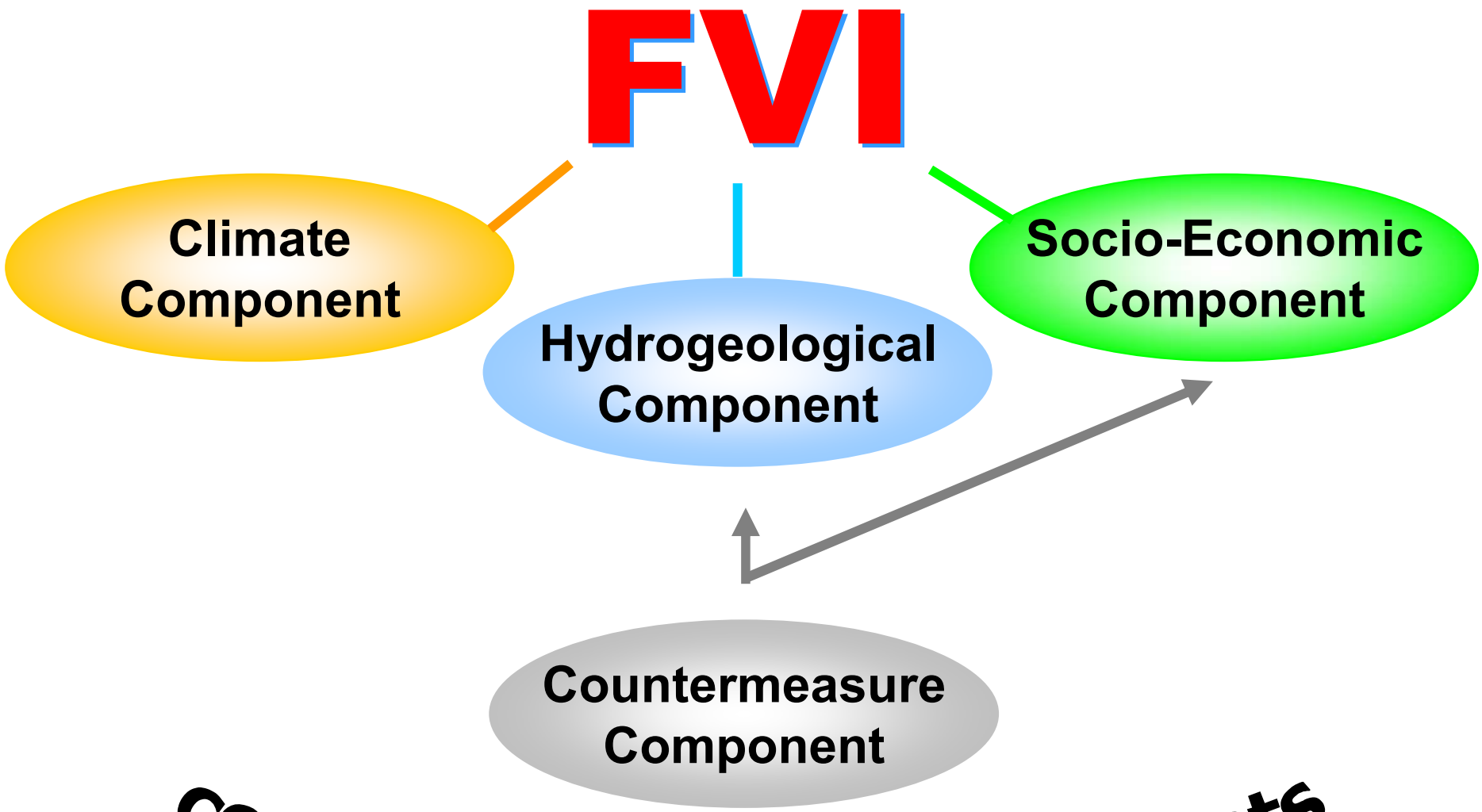
FVI can be an important policy-making tool for

1) raising public awareness,

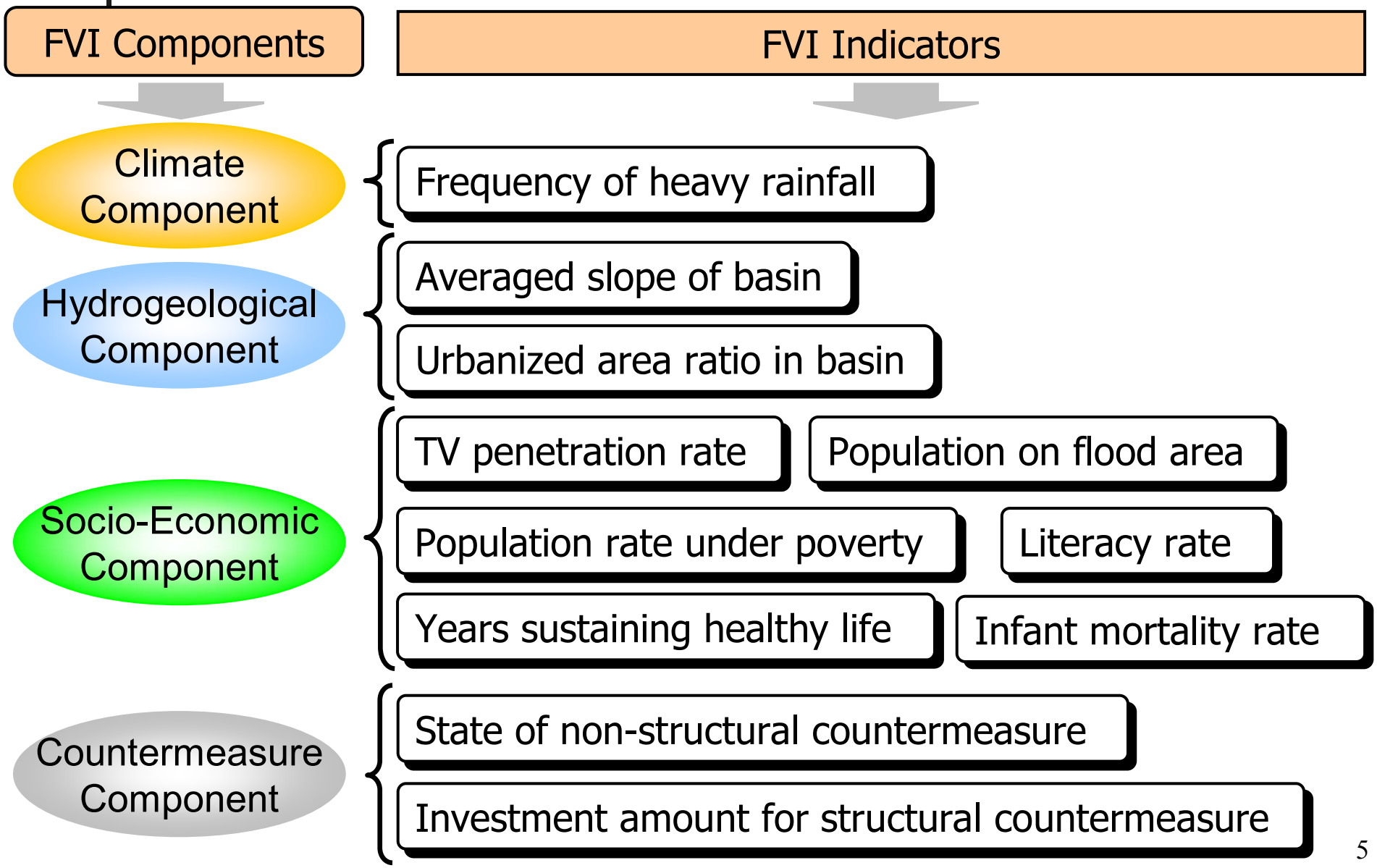
2) assisting governments in priority setting and

3) guiding the international organizations in directions of involvement.

The Four Key Components



These components might be categorized as below



Example of quantification of FVI indicator

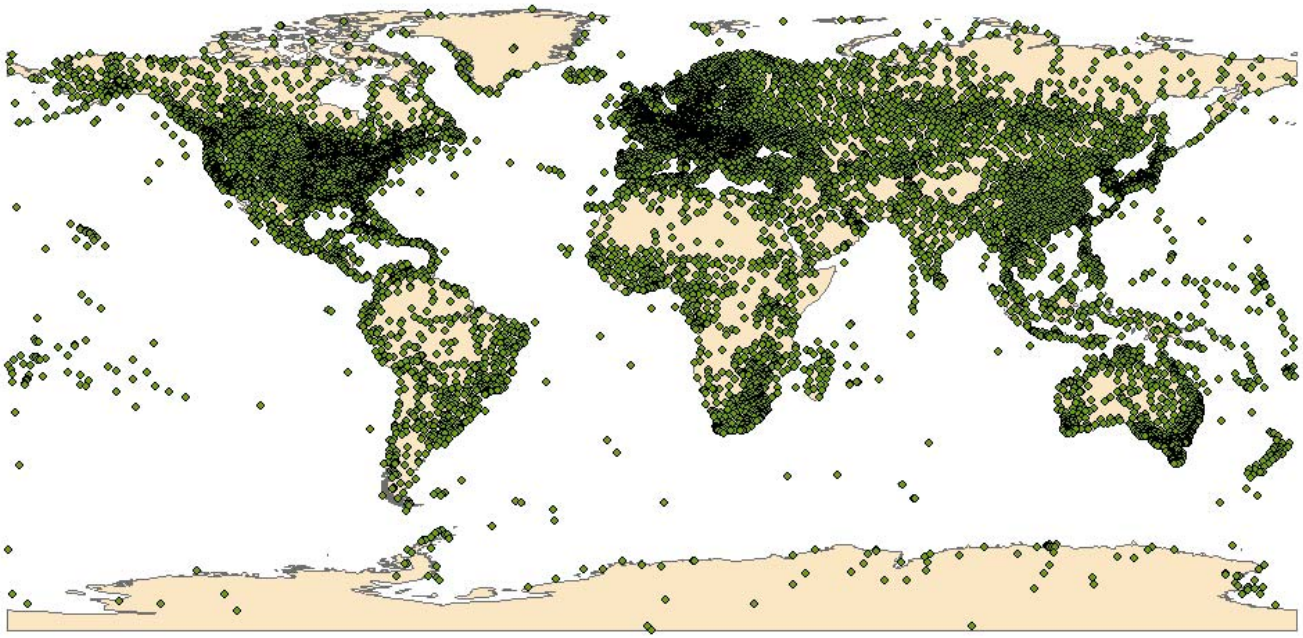
Frequency of heavy rainfall

- Data definition:

  The number of days of heavy rainfall with more than 100mm/day in the basin in a year

- Data collection
  - Data from NOAA
  - Daily rainfall
  - 13,000 observation points the past 11 years

Fig. 13,000 rainfall observation points



Downloaded from the NOAA website (http://lwf.ncdc.noaa.gov/oa/climate/climatedata.html)

FVI equation for the major international river basins

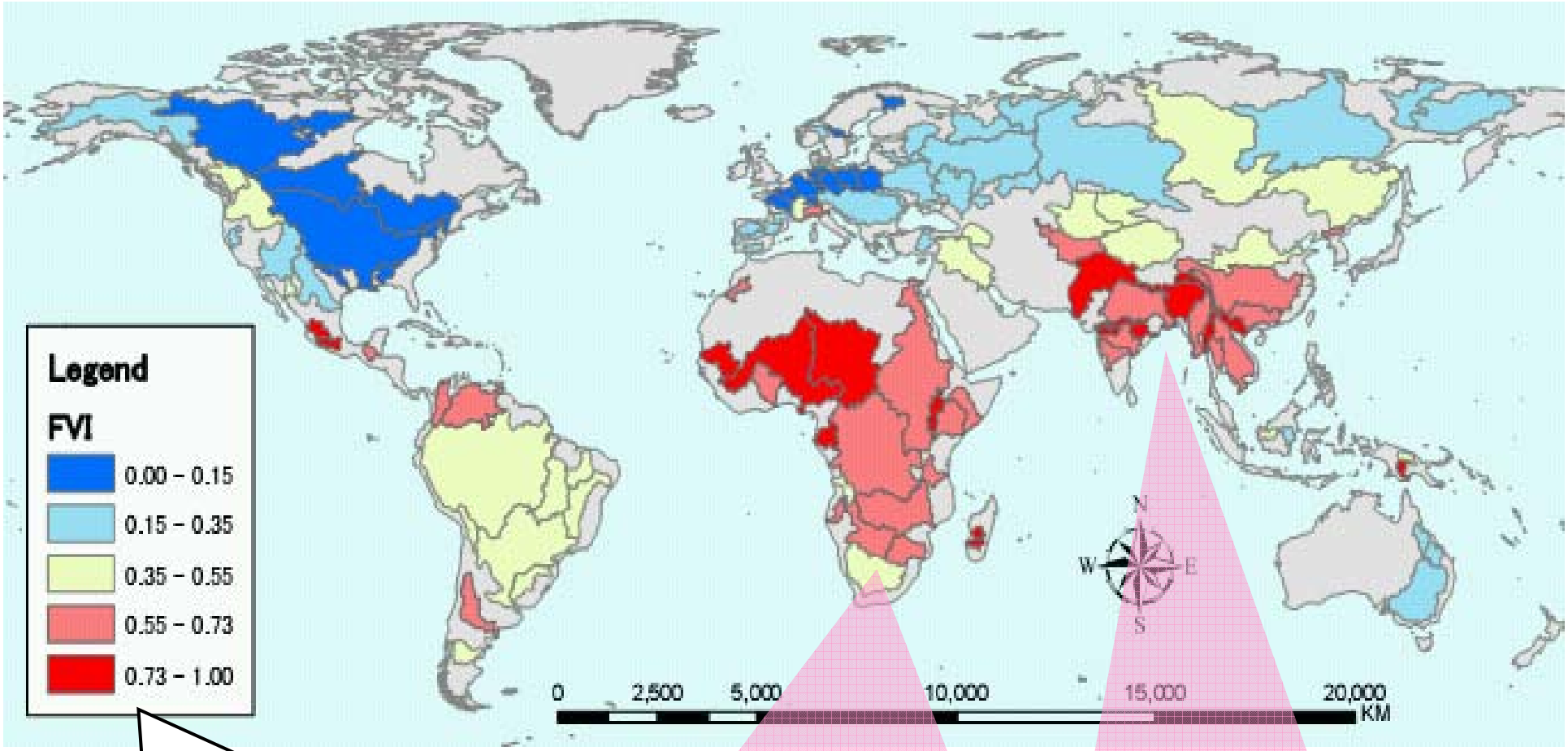
Climate Component | Hydrogeological Component | Socio-Economic Component | Countermeasure Component

$$FVI = C + H + S - M$$

$$= (3 \times I_1) + (3 \times I_2 + I_3) + (-I_4 - I_5 + I_6 - I_7 + I_8 + I_9) - (I_{10} + I_{11})$$

- I_1: Frequency of heavy rainfall (more than 100mm/day)
- I_2: Averaged slope of basin
- I_3: Urbanized area ratio in basin
- I_4: TV penetration rate
- I_5: Literacy rate
- I_6: Populati on rate under poverty
- I_7: Years sustaining healthy life
- I_8: Population in flood area
- I_9: Infant mortality rate
- I_{10}: Investment amount for structural counter-measure
- I_{11}: State of non-structural counter-measure

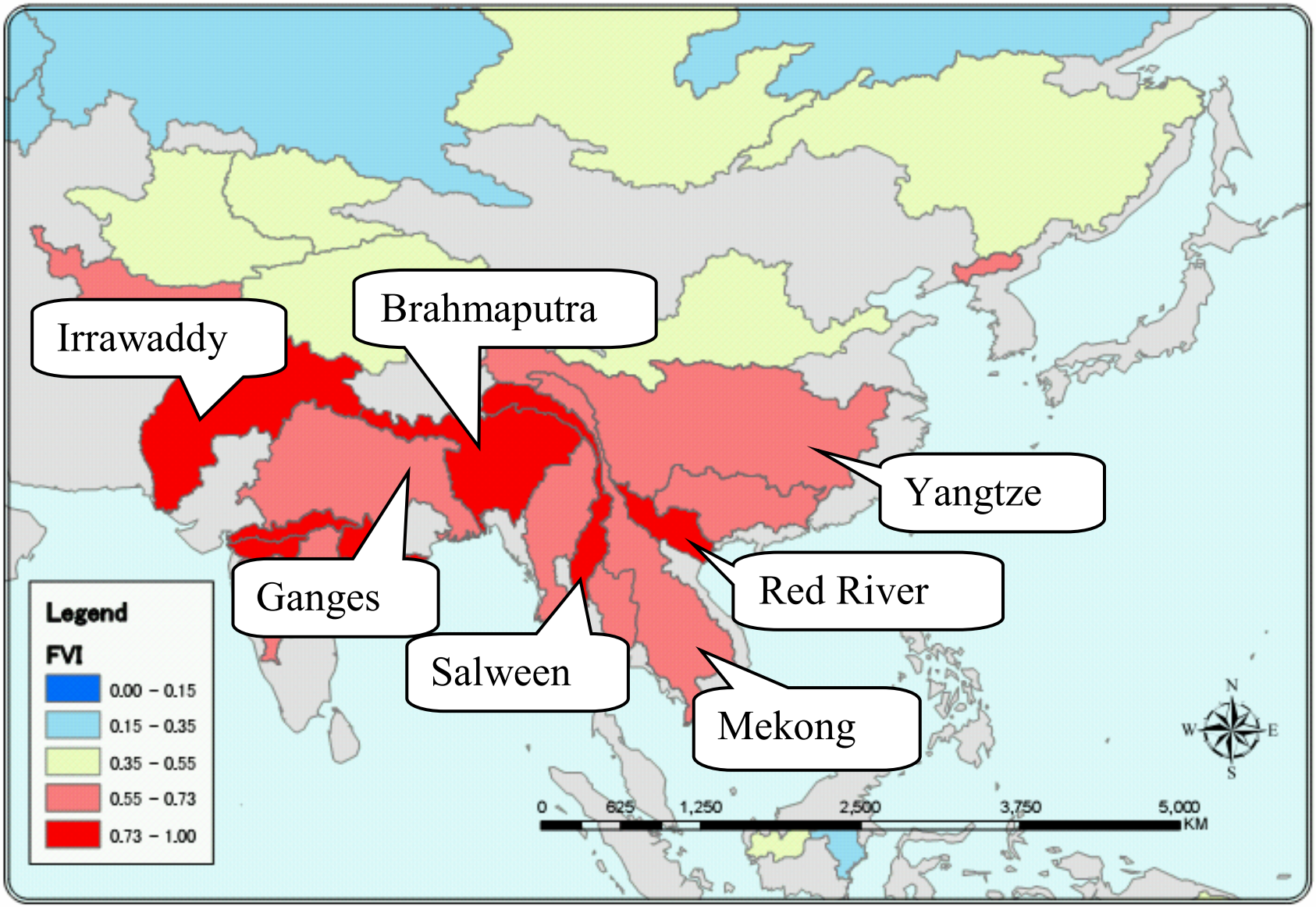
FVI map of the major international river basins (114 basins)



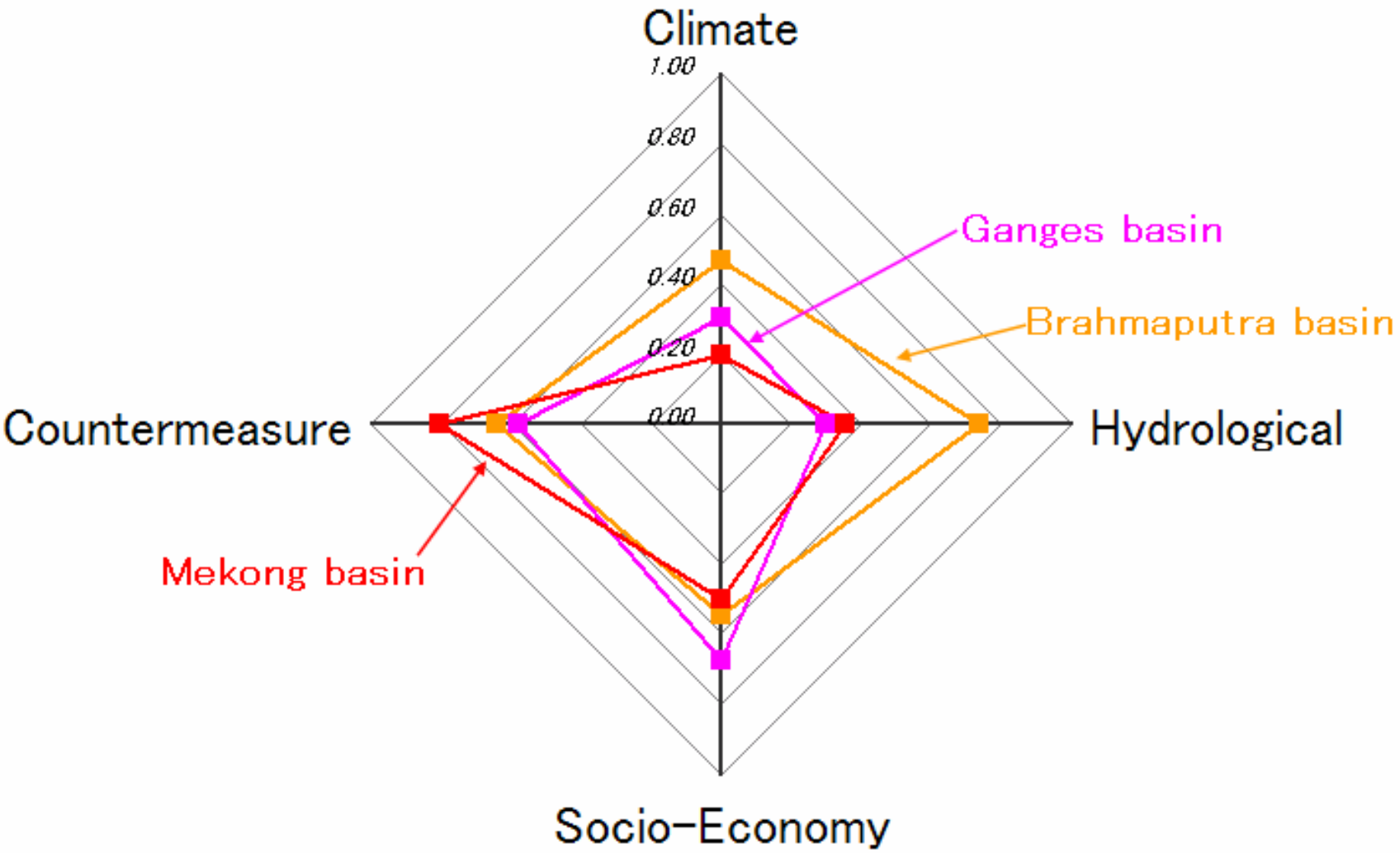
The lower the value, the better.

FVI scores are higher in South Asia and Africa.

FVI in South Asia

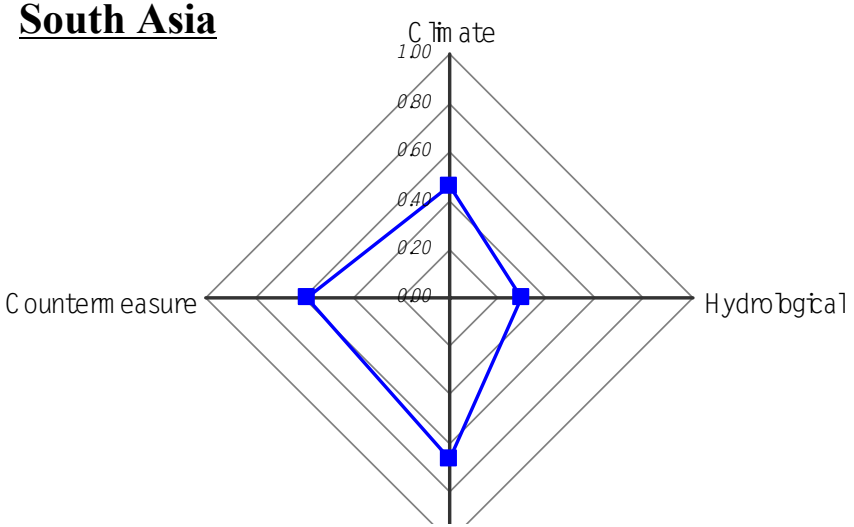


Rader Chart of FVI Components

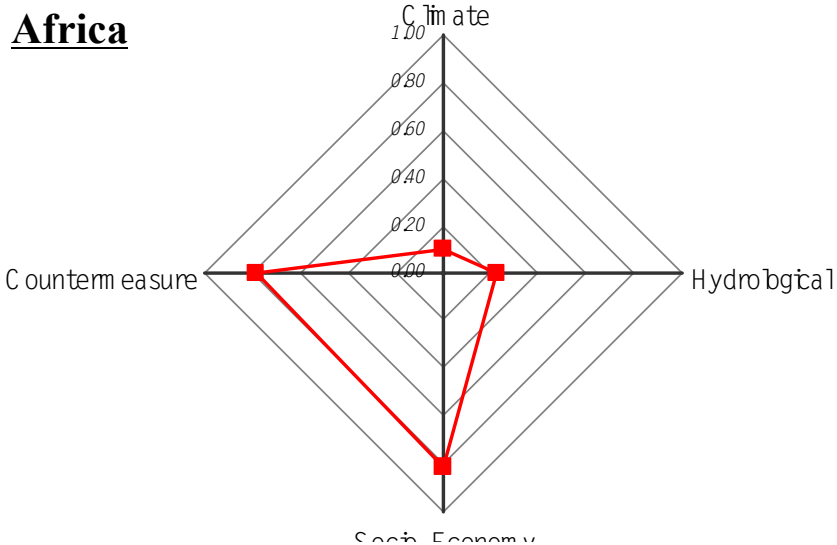


Rader Chart of FVI Components

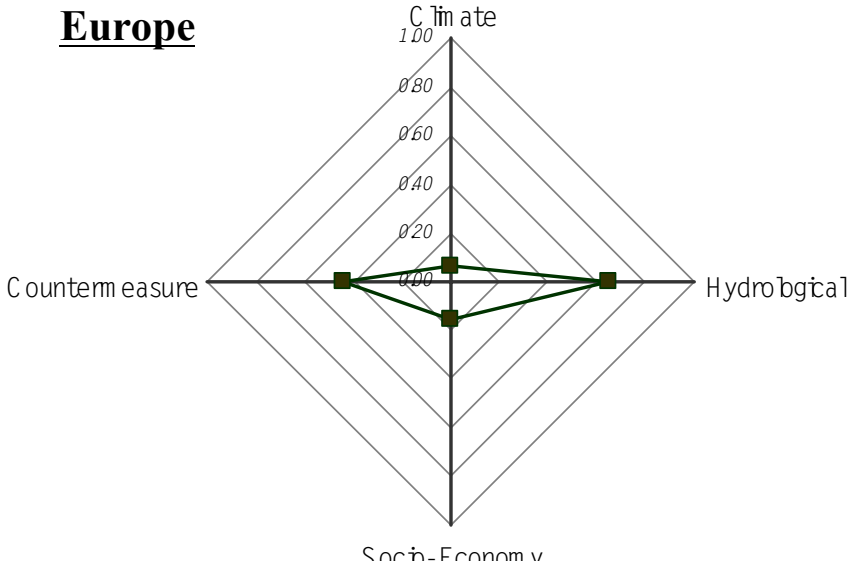
South Asia



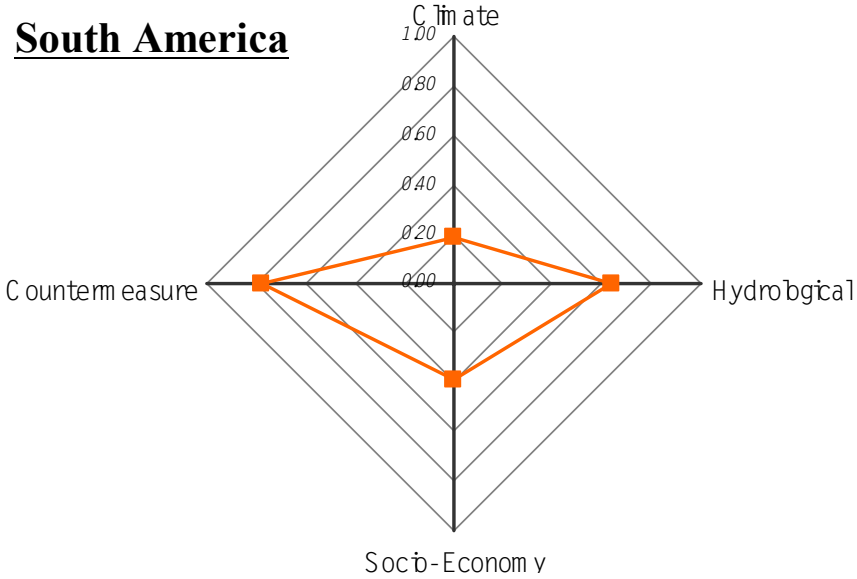
Africa



Europe



South America



Potential Applications

1. Assess flood vulnerability in any basin in the world by using easily collectable data

2. Better understand the complex nature of vulnerability

3. Compare basins and see how different factors influence vulnerability

4. To serve as a useful tool in considering long-term flood management policy

Application of Flood Vulnerability Index in the Philippines

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Flood Disasters in The Philippines

Ormoc Tragedy On November 5, 1991, rampaging flashflood struck Ormoc City (on the west coast of the island of Leyte) killing less than an hour close to 8000 people and left thousands homeless.

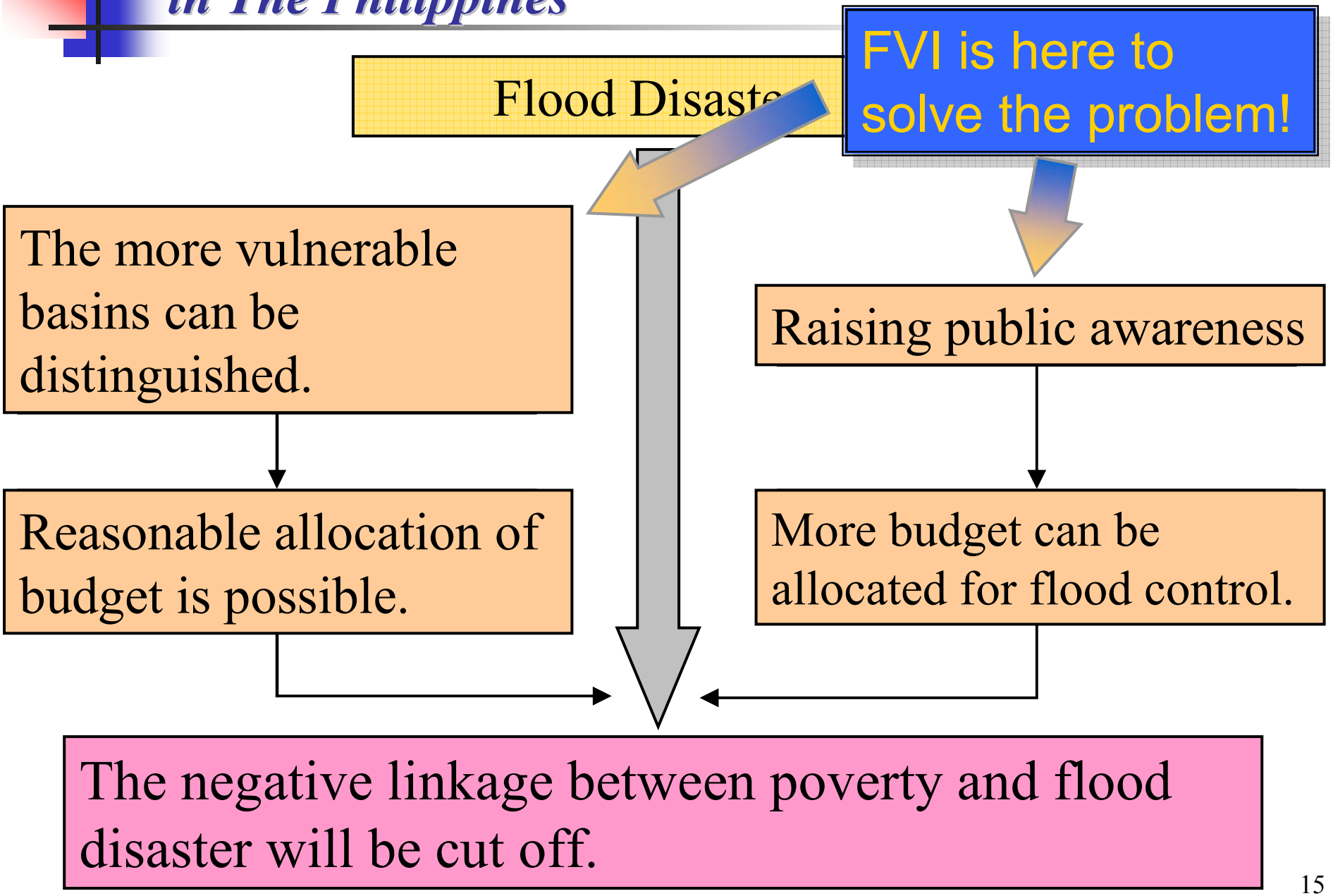
Flash Flood A great part of the city was destroyed and number of houses and properties were destroyed by rampaging water and mud.

Urban Flooding Informal settlers along banks of waterways, inadequate capacity of drainage channels and unabated disposal of garbage into waterways contribute to urban flooding

Source: AP

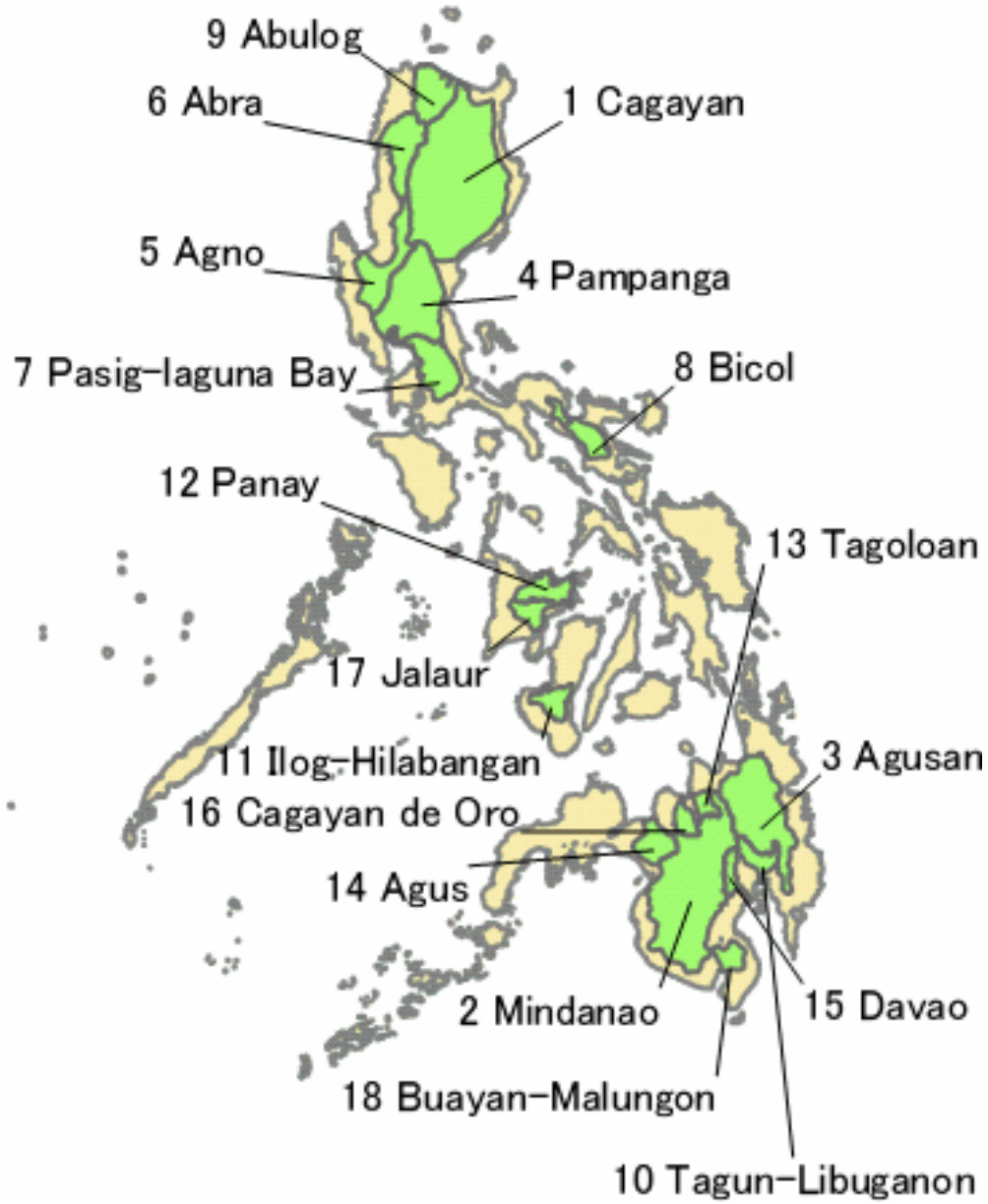
Source: Water-Related disaster Threats in the Philippines by Resito V. David of FCSEC, DPWH.

Problems to be solved in the field of flood control in The Philippines

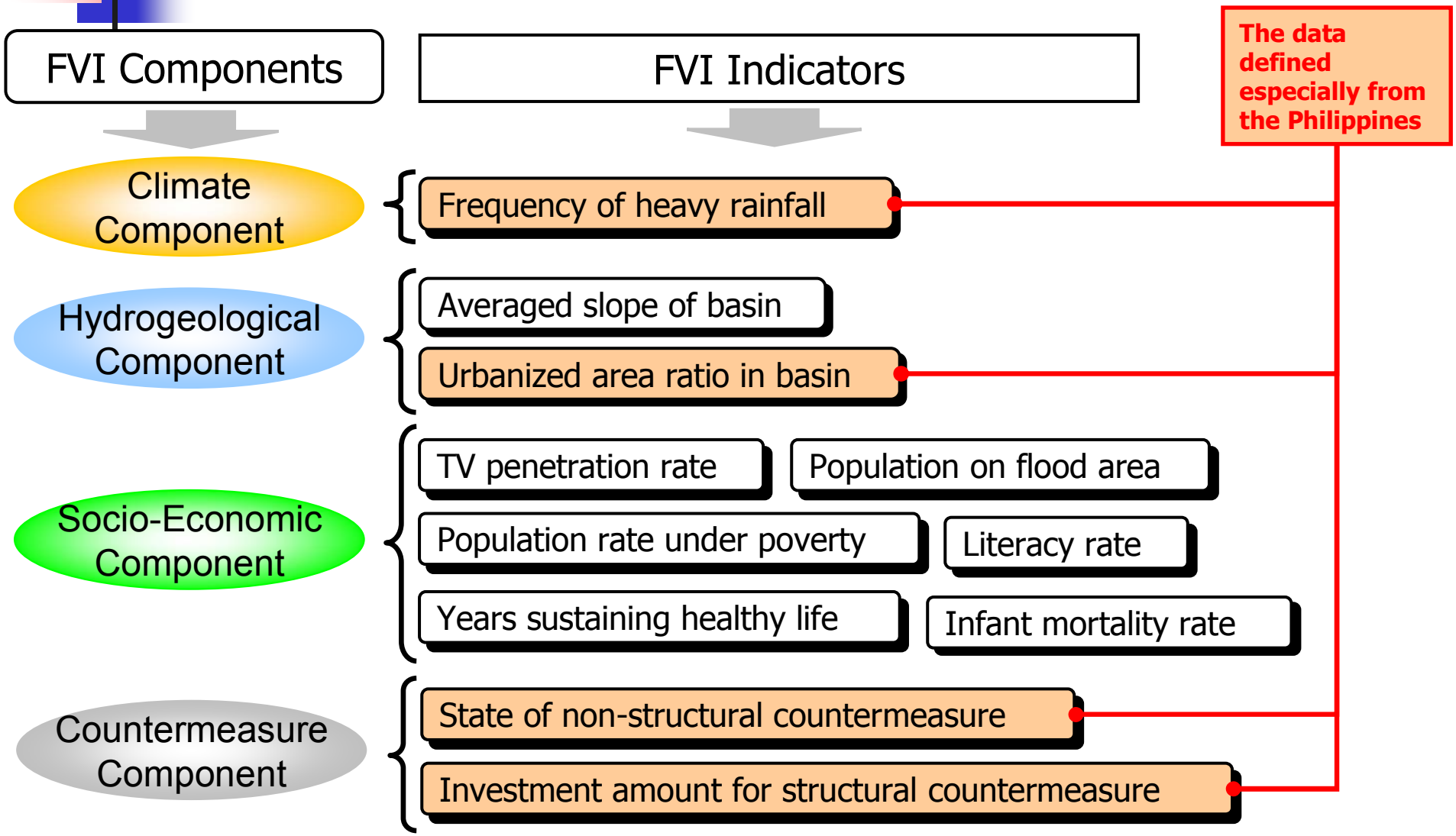


Flood Vulnerability Index applied for the river basins in The Philippines

- The FVI methodology was simply applied for the 18 major river basins in The Philippines.

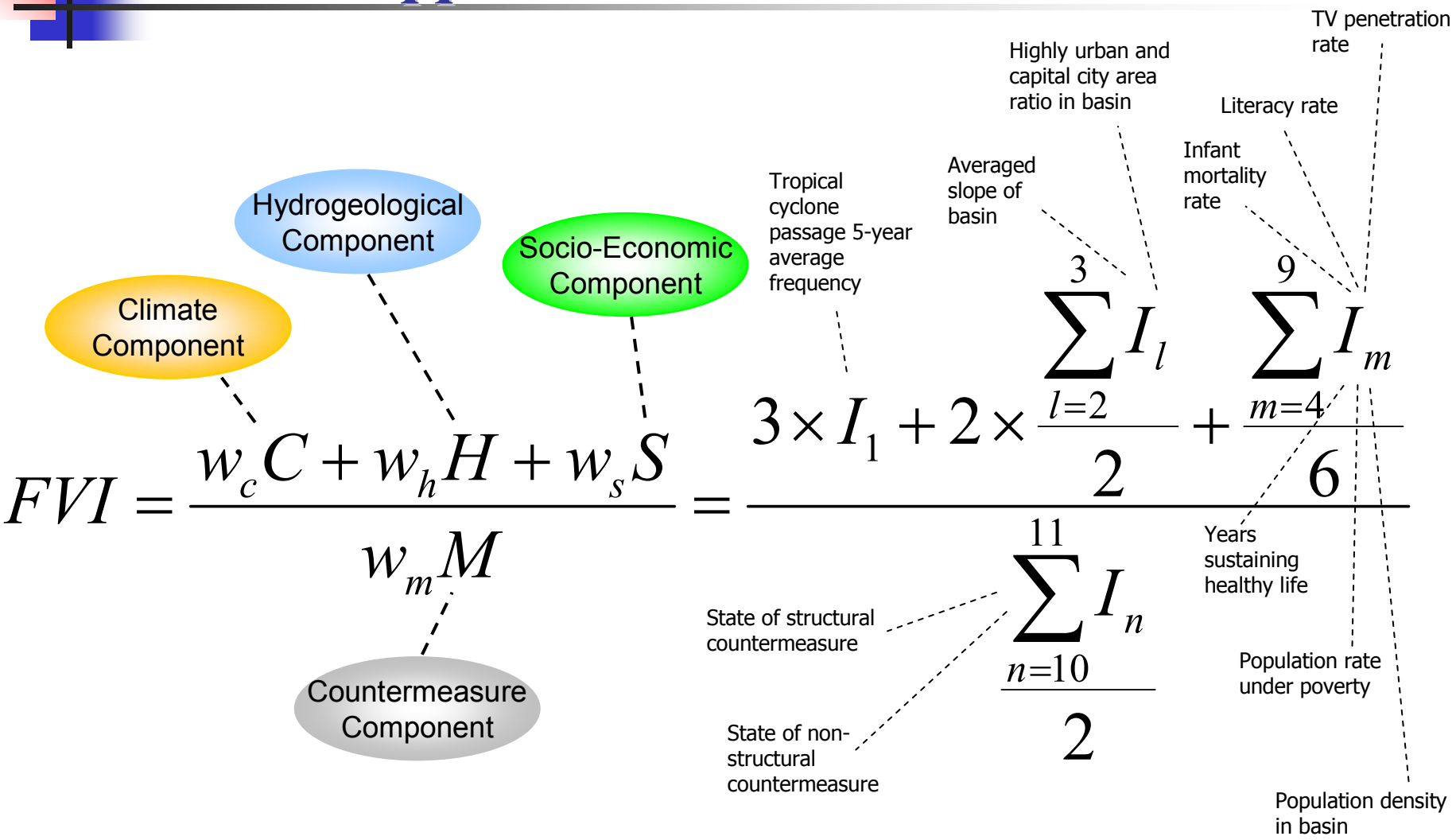


FVI Indicators

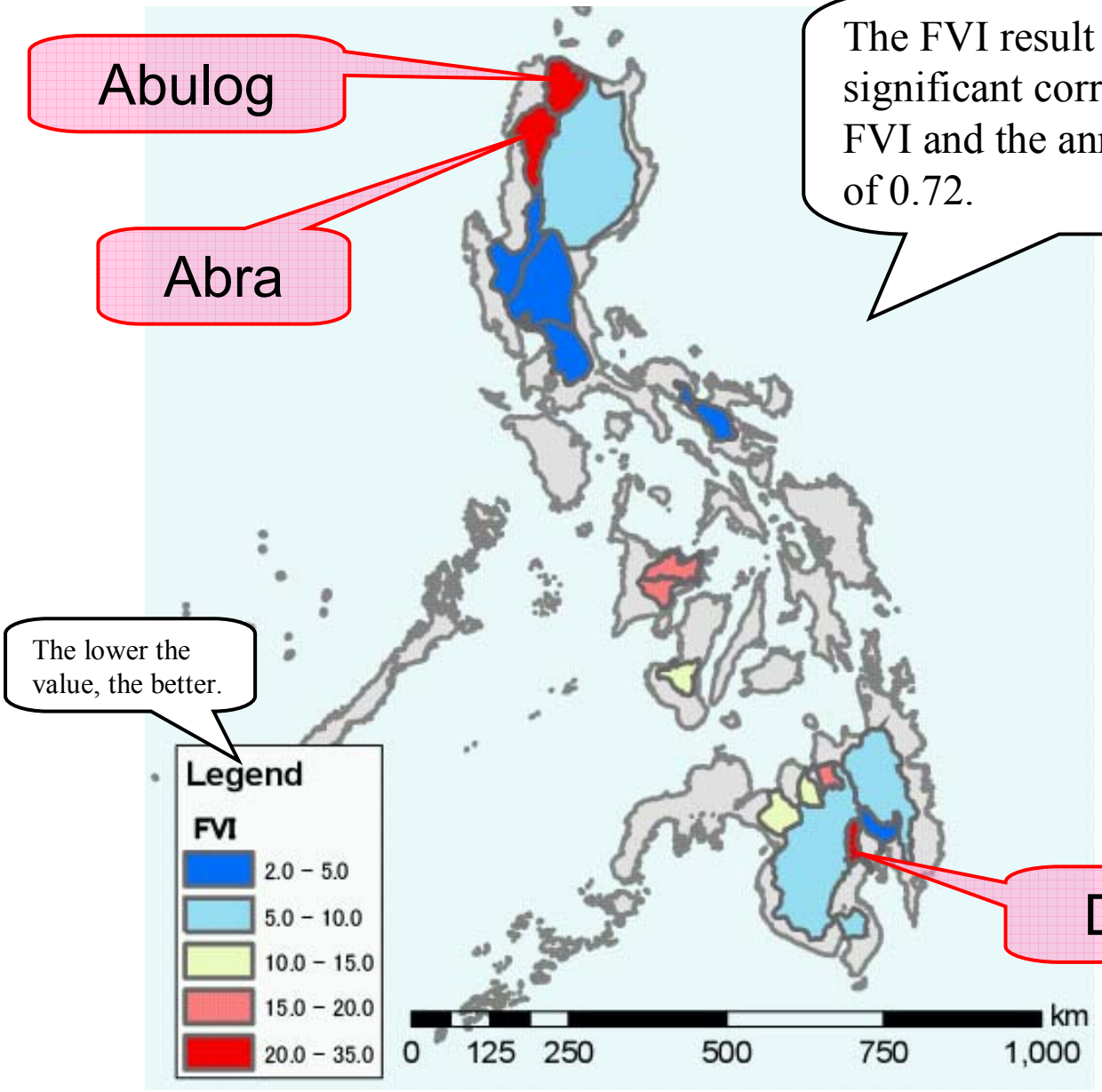


Most of the data source are from DPWH, PAGASA and NSO.

FVI equation for the major river basins in The Philippines

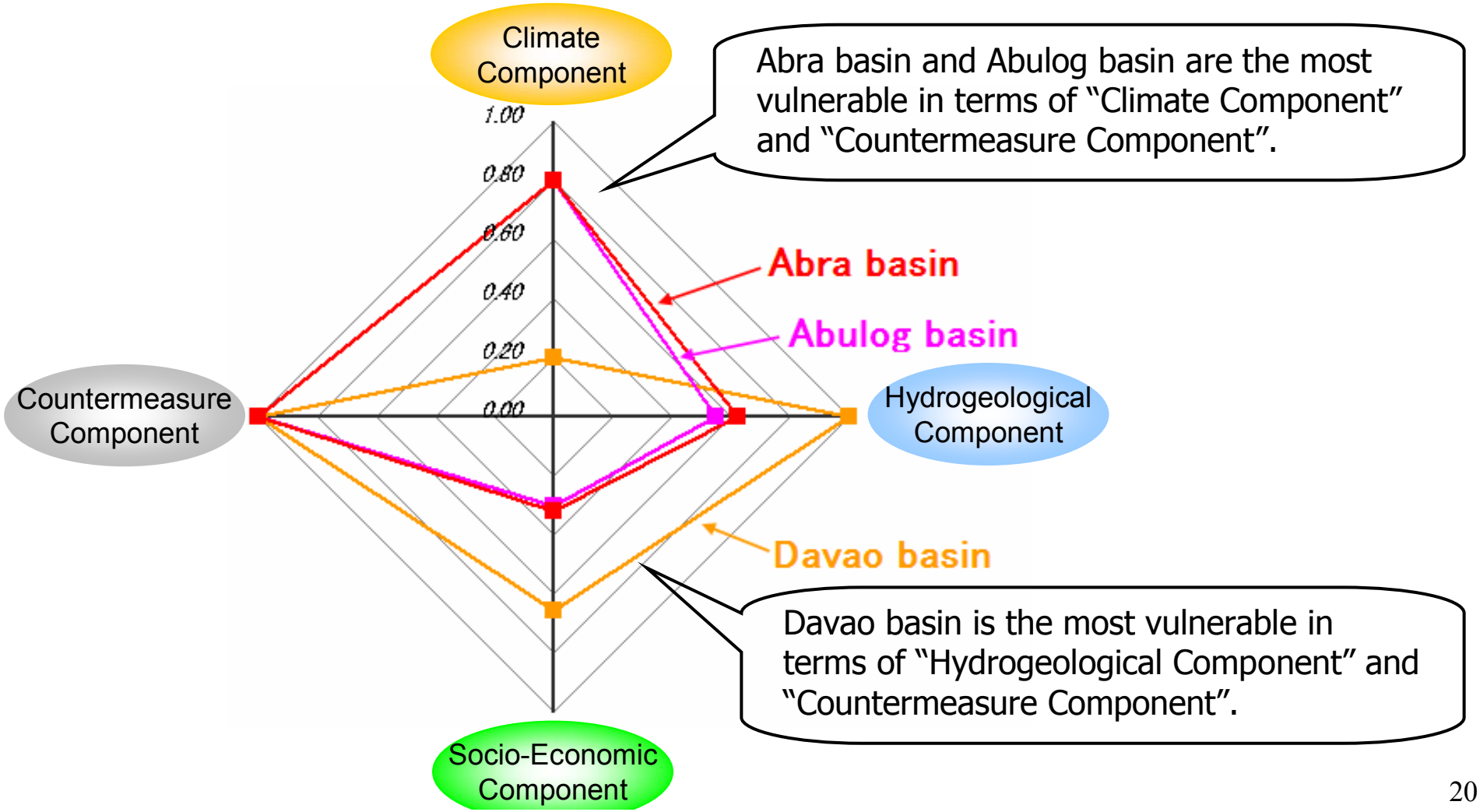


FVI assessment result



The most vulnerable river basins

- The three basins (Abra, Abulog and Davao) are assessed as the most vulnerable to flood disaster.



Tool for Guiding Policy

FVI can be an important policy-making tool for

1) raising public awareness,

2) assisting governments in priority setting

3) guiding the international organizations in directions of involvement.

Conclusions and Challenges

- FVI based on the Philippines' data shows quantitatively the vulnerability of each basin.
- We have reached at the starting point from which to prioritize activities aimed at reducing flood vulnerability.
- FCSEC will continue the study with FVI to assess the flood vulnerability for 421 principal river basins annually or biennially.