Flinders UNIVERSITY

Drought Monitoring in Cambodia

Asia-Pacific Climate Change Adaptation Forum 2014

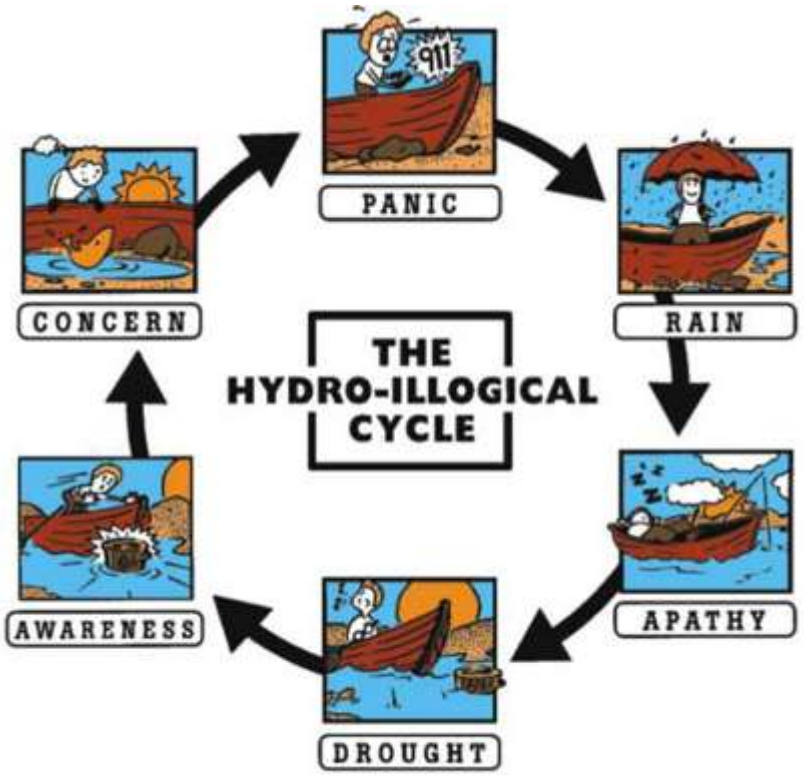
1-3 October 2014 Kuala Lumpur, Malaysia

CHHINH Nyda
chhinh.nyda@rupp.edu.kh

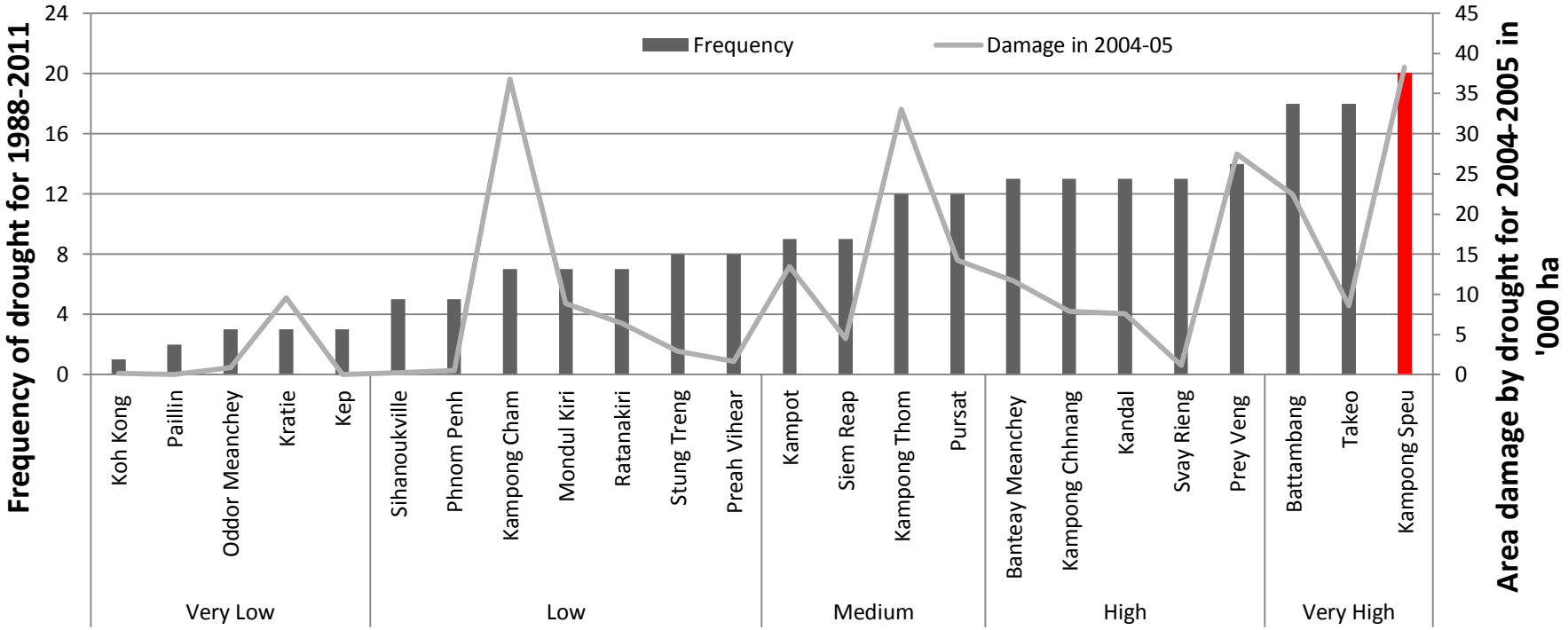
We Can Monitor DROUHGT?

Tannehill (1947) notes:

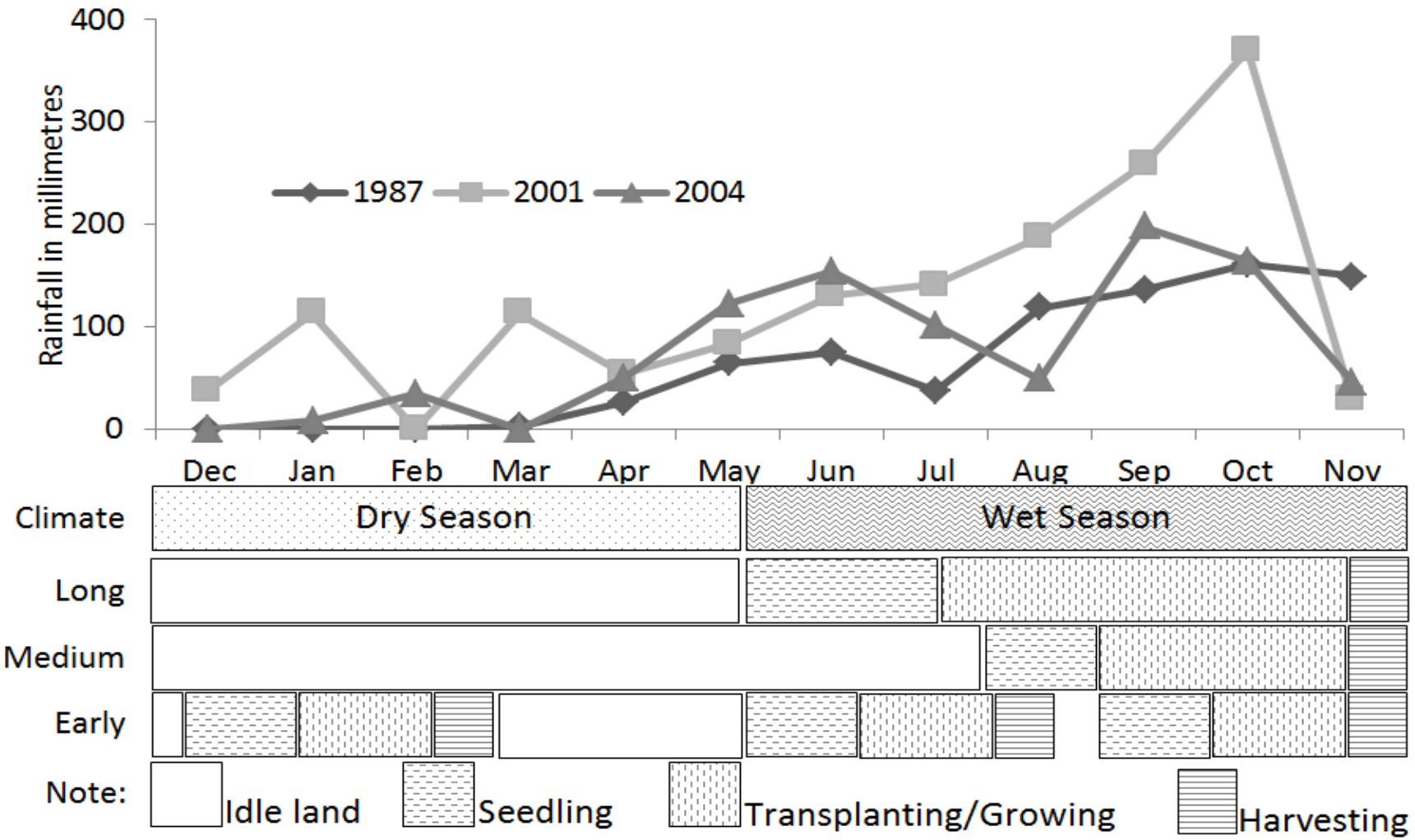
"We may truthfully say that we scarcely know a drought when we see one. We welcome the first clear day after a rainy spell. Rainless days continue for some time and we are pleased to have a long spell of fine weather. It keeps on and we are a little worried. A few days more and we are really in trouble. The first rainless day in a spell of fine weather contributes as much to the drought as the last, but no one knows how serious it will be until the last dry day is gone and the rains have come again … we are not sure about it until the crops have withered and died".



Drought Damage in Cambodia



Drought and Rice Calendar



How Drought Is Monitored?

Major drought indices

Drought Indices	Description
Percent of Normal	Actual precipitation / normal precipitation (a 30-year-mean)
Standardized Precipitation Index	Probability of precipitation for any time scale
Palmer Drought Severity Index	Soil moisture algorithm for relative homogeneous regions
Crop Moisture Index	A Palmer derivative to reflects moisture supply in the short term
Deciles	Groups monthly precipitation occurrences into Deciles

Why Standardize Precipitation Index

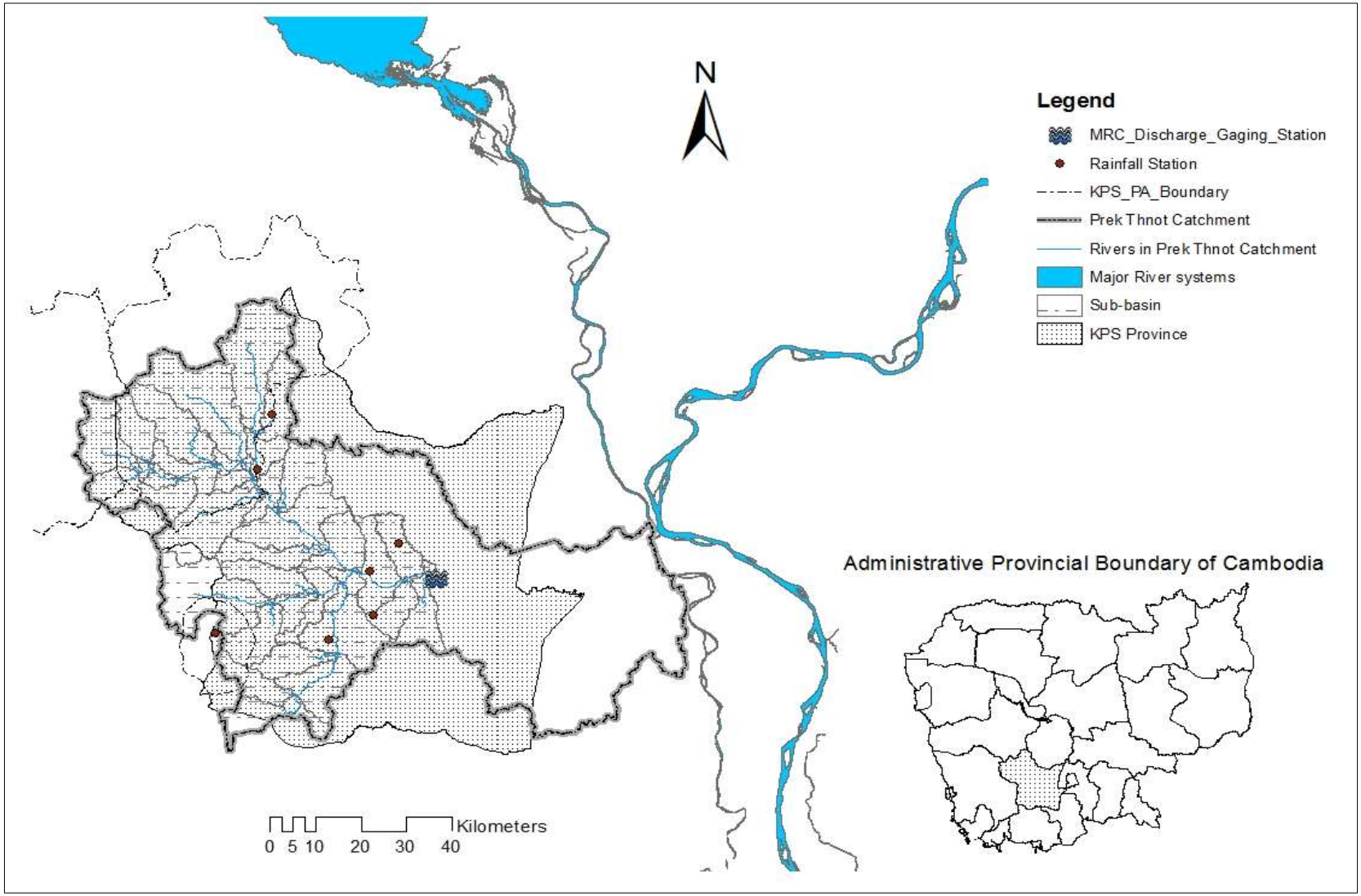
Standardize Precipitation Index (SPI):

- Need only rainfall data
- Can be used for early warning of drought onset
- Assess drought severity
- Assess different time scales

Used by:

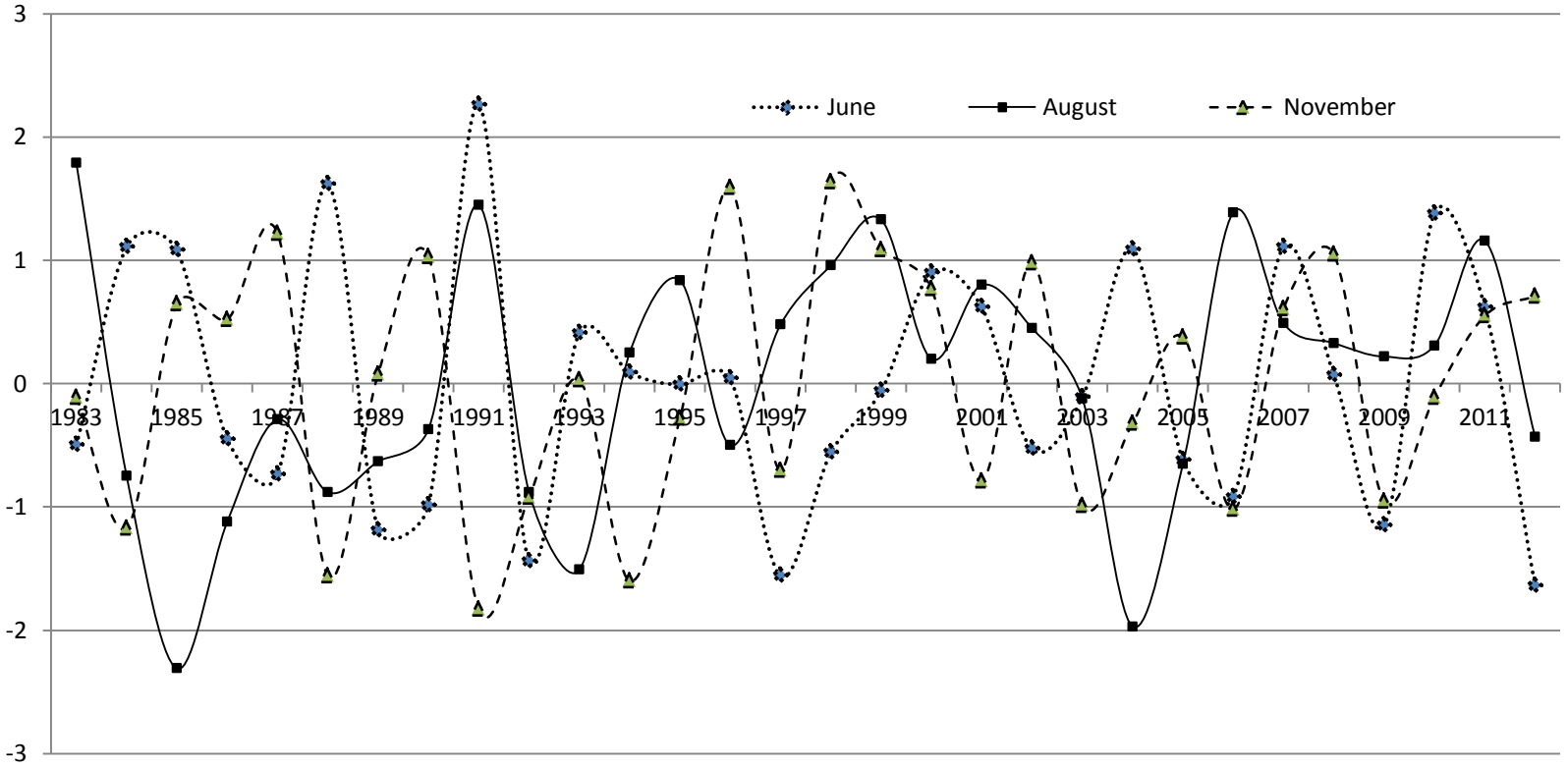
- The U.S (National Drought Mitigation Centre)
- Asia (such as India)
- Europe (European Drought Centre)

SPI and Drought in Kampong Speu Province



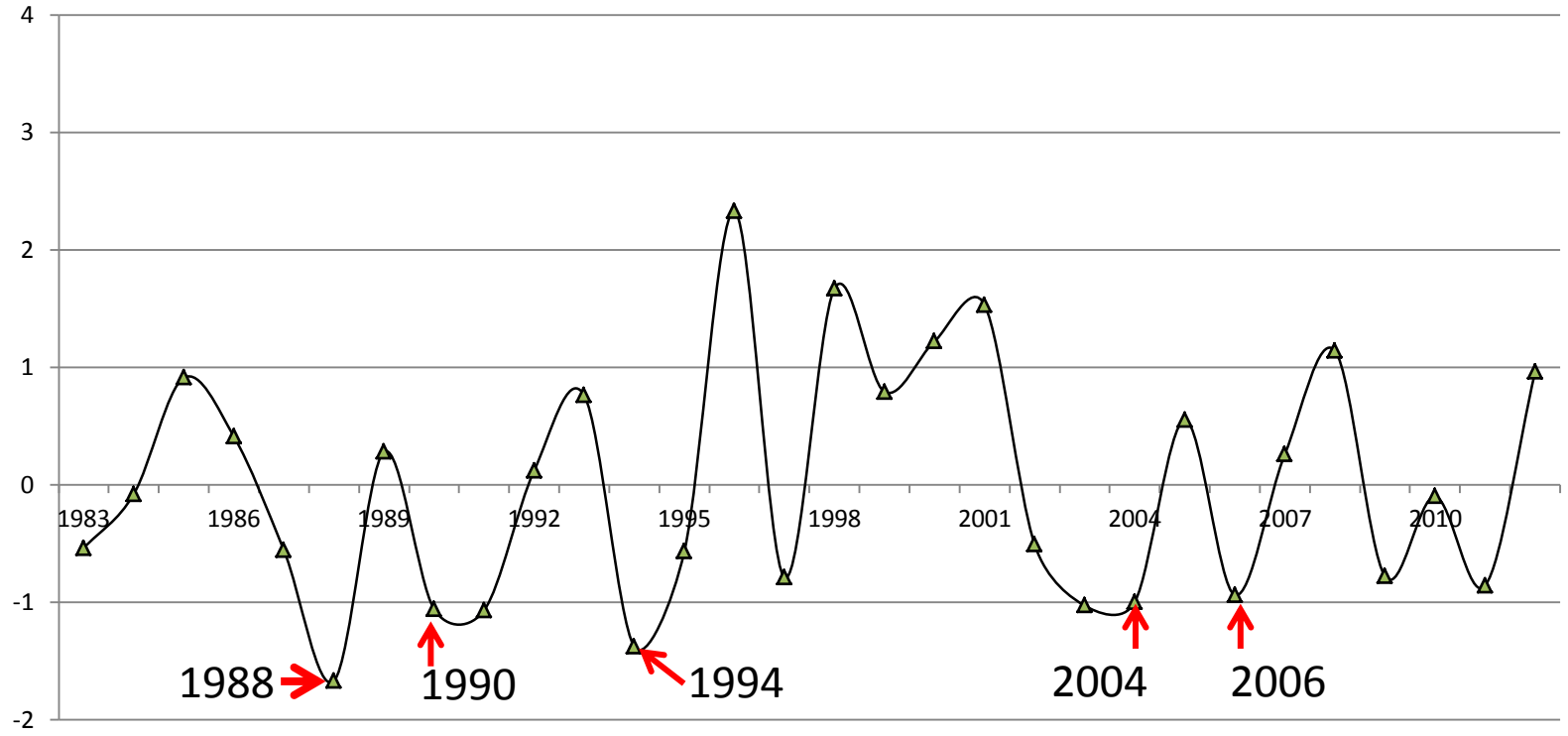
SPI and Drought in Kampong Speu Province

SPI one month period

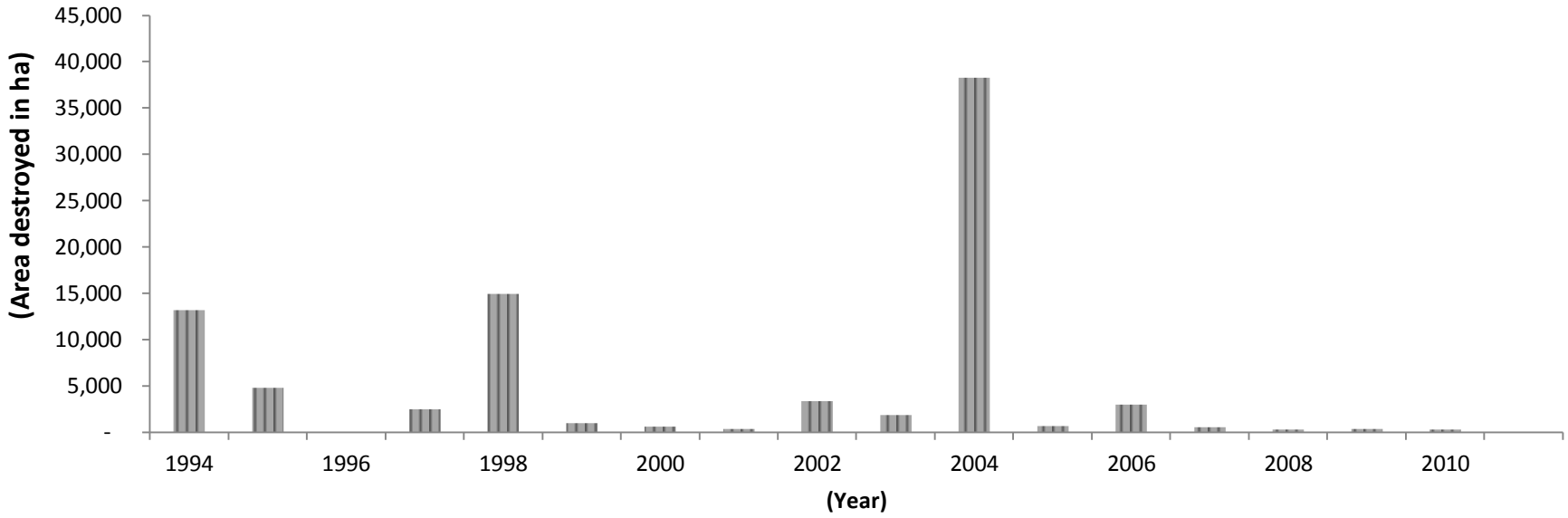


SPI and Drought in Kampong Speu Province

SPI three month period for November



SPI and drought in Kampong Speu Province



Paddy rice and Cash crop field damages (in ha) by drought in KPS, 1994-2010

Software to Run SPI

- SPI runs in C language at http://drought.unl.edu/MonitoringTools/DownloadableSPIProgram.aspx
- SPI runs in R language at http://cran.r-project.org/web/packages/SCI/

- World Meteorology Organization development manual for SPI run in C language at http://www.wamis.org/agm/pubs/SPI/WMO_1090_EN.pdf

- Meteorological Statistics can be found from:

Thom, Herbert Conrad Schlueter. (1966). *Some methods of climatological analysis: Secretariat of the World Meteorological Organization.*

SPI formula, if use EXCEL

Gamma function found to fit with meteorological data

$$g(x) = \frac{1}{\beta^{\alpha}\Gamma(\alpha)} x^{\alpha-1} e^{-\frac{x}{\beta}}$$

Where β is a scale parameter, α is a shape parameter, and Γ(α) is the ordinary gamma function of α.

$$\hat{\alpha} = \frac{1}{4A}\left(1 + \sqrt{1 + \frac{4A}{3}}\right)$$

And $\hat{\beta} = \frac{\hat{x}}{\hat{\alpha}}$ where $A = ln\overline{x} - \frac{\sum lnx}{n}$

Let Monitor Drought

With proper data recording, drought can be monitored and possibly avoided by using Standardized Precipitation Index.

Thank You!