

Developing a Global Handbook of Drought Indicators and Indices

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Types of Drought

There are *indices and indicators* used to identify *all* of these types of drought at various thresholds

There is *no single definition* of drought

Thus, in most cases, there is *no "one-size-fits-all"* drought indicator or index

Meteorological

Ecological/Environmental

Agricultural

Hydrological

Socioeconomic

What is a Drought *Indicator* versus a Drought *Index*?

Indicator: a measure of a meteorological, hydrological, agricultural, or socio-economic variable that provides an indication or ***“description”*** of potential drought related stress or deficiency.

Index: a method of deriving ***“value added”***, or ***“quantifiable”***, information related to drought by comparing current conditions to historical information based upon statistical calculations.

(Note: Indices are indicators as well!)



Integrated Drought Management Programme (IDMP) (WMO + GWP)

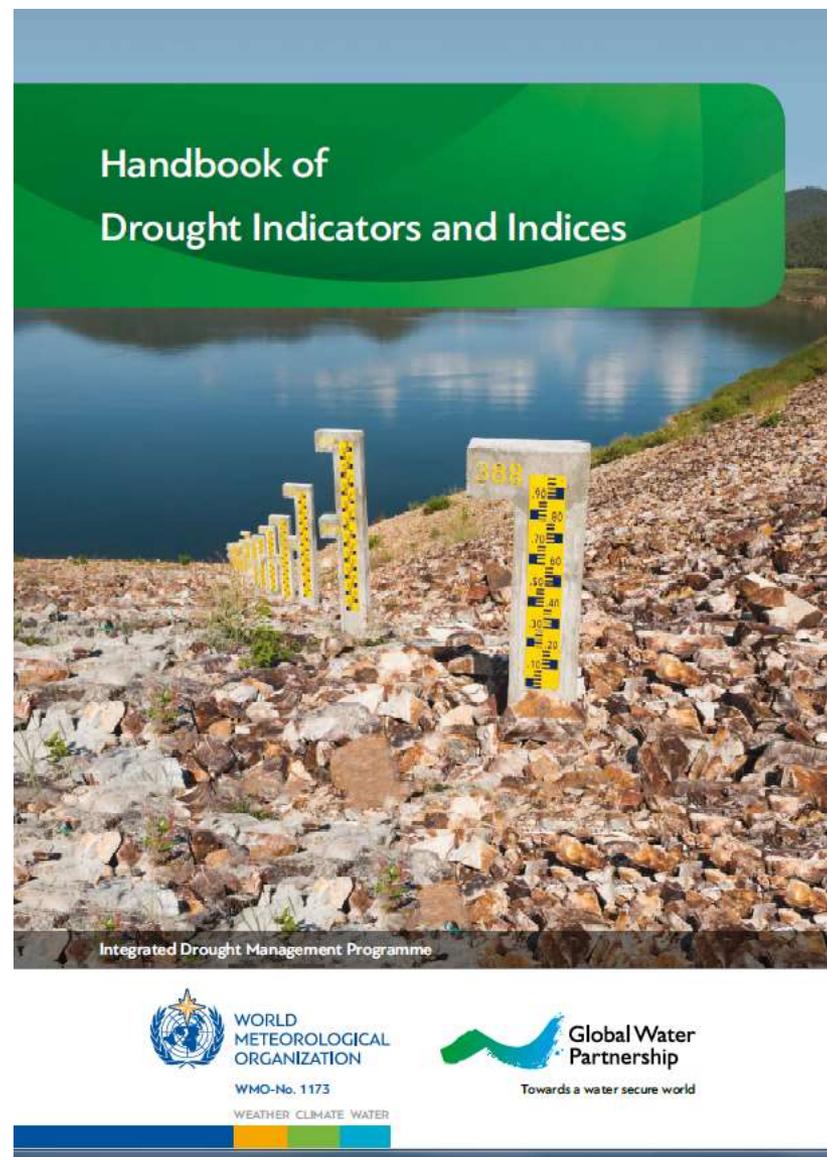
Indicators **AND** Indices

Taken from applications in **every region** of the world

~50 indicators described in all

Sorted by **theme**

Categorized by using a **traffic light** approach



Freely available on-line

<http://www.droughtmanagement.info/handbook-drought-indicators-and-indices/>

Monitoring Drought: A Handbook of Indicators and Indices

The ***purpose*** of this handbook is to ***identify some of the most commonly used*** physically-based drought ***indicators/indices*** that are being applied across drought-prone regions with the goal of advancing monitoring, early warning and information delivery systems ***in support of risk-based drought management*** policies and preparedness plans.

The Handbook ***can't tell you*** which one is best for you though!

Monitoring Drought: A Handbook of Indicators and Indices

The indicator/index types are ***grouped into themes***, which directly correspond to the meteorological, agricultural and hydrological drought types:

1) temperature and/or precipitation; 2) soil moisture; 3) hydrological; 4) satellite and vegetation; and 5) composite, modeled or experimental

Monitoring Drought: A Handbook of Indicators and Indices

For the ***“ease of use”*** classification, a ***“traffic light”*** approach for each indicator/index was adopted where:

Green: Indicators are considered to be green if one or more of the following criteria apply:

- ***Code or program*** to run the index ***is readily and freely available***
- Does not require daily data
- Does allow for missing data
- ***Output*** of the index is ***already being produced operationally and is made available*** on the web

Monitoring Drought: A Handbook of Indicators and Indices

Note: While a *“green” ease of use classification may imply that the indicator/index may be the easiest* to obtain or use, it *does not mean it is the best index/indicator* for any given region or locale. This decision as to which indicator(s)/indices to use has to be determined by the user and depends on the given application(s).

Monitoring Drought: A Handbook of Indicators and Indices

Yellow: Indices are considered to be yellow if one or more of the following criteria apply:

- **Multiple variables** or inputs needed for calculations
- **Code or program** to run the index is **not available** in a public domain
- May only need a single input or variable, but no code is available
- The **complexity of the calculations** needed to produce the index **is minimal**

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- Red:** Indices are considered to be red if one or more of the following criteria apply:
- Would need to **develop code** to calculate the index based upon the methodology in the literature
 - The index or derivative products are **not readily available**
 - An **obscure index** which is not widely used, but may be applicable to some
 - Any index which contains **modeled input** or is part of the calculations

Meteorological Based	Page	Ease of Use	Inputs Required	Additional Information
Aridity Anomaly Index (AAI)		Green	P,T, PET, ET	Operationally available for India
Deciles		Green	P	Ease of calculation and examples from Australia useful
Keetch-Byram Drought Index (KBDI)		Green	P,T	KBDI calculations are based upon the climate of the area of interest
Percent of Normal Precipitation		Green	P	Simple calculations
Standardized Precipitation Index (SPI)		Green	P	The WMO highlighted the SPI as a starting point for meteorological drought monitoring
Weighted Anomaly Standardized Precipitation (WASP)		Green	P,T	Uses gridded data in monitoring drought in tropical regions
Aridity Index (AI)		Yellow	P, T	Can also be used in climate classifications
China Z Index (CZI)		Yellow	P	Intended to improve upon what the SPI provides
Crop Moisture index (CMI)		Yellow	P,T	Weekly values are needed
Drought Area Index (DAI)		Yellow	P	Gives an indication of how the monsoon season perform
Drought Reconnaissance Index (DRI)		Yellow	P, T	Monthly temperature and precipitation needed
Effective Drought Index (EDI)		Yellow	P	Program is available through direct contact with originator
Hydro-Thermal Coefficient (HTC)		Yellow	T,P	Ease in calculations and several examples in Russia
NOAA Drought Index (NDI)		Yellow	P	Best used in agricultural applications
Palmer Drought Severity Index (PDSI)		Yellow	P,T, AWC	Not green due to complexity of calculations and the need for serially complete data
Palmer Z Index		Yellow	P,T, AWC	One of the many outputs of the Palmer Drought Severity Index calculations
Rainfall Anomaly Index (RAI)		Yellow	P	Serially complete data required
Self-Calibrated Palmer Drought Severity Index (sc-PDSI)		Yellow	P,T, AWC	Not green due to complexity of calculations and serially complete data needed

Standardized Anomaly Index (SAI)		Yellow	P	Point data used to describe regional conditions
Standardized Precipitation Evapotranspiration Index (SPEI)		Yellow	P, T	Serially complete data required, output similar to the SPI but with a temperature component
Agricultural Reference Index for Drought (ARID)		Red	P,T, Mod	Regionally produced in the southeastern United States and not tested widely outside of the region
Crop Specific Drought Index (CSDI)		Red	P,T,Td,W,Rad, AWC, Mod, crop data	Quality data of many variables needed, making its use a challenge
Reclamation Drought Index (RDI)		Red	P,T,S,R, SF	Similar to the SWSI, but contains a temperature component
Soil Moisture Based		Ease of Use	Inputs Needed	Additional Information
Soil Moisture Anomaly (SMA)		Yellow	P,T, AWC	Intended to improve upon the water balance of the PDSI
Evapotranspiration Deficit Index (ETDI)		Red	Mod	Complex calculations with multiple inputs needed
Soil Moisture Deficit Index (SMDI)		Red	Mod	Weekly calculations at different soil depths, complicated to calculate
Soil Water Storage (SWS)		Red	AWC,RD,ST,S WD	Due to variation in both soil and crop types, interpolation over large areas is challenging
Hydrological Based		Ease of Use	Inputs Needed	Additional Information

**Thank You!
Questions?**

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