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Climate Risk Management for Health

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PAHO/WHO Collaborating Centre on early warning systems for malaria and climate sensitive diseases



Health and climate.....

Climate may impact on health through a number of mechanisms

- directly through cold or heat stress – aggravating conditions such as heart disease and respiratory conditions,
- and indirectly, for example through:
 - a) food security - nutritional status and immuno-suppression,
 - b) water source quality and water-borne disease
 - c) infectious disease (impact of climate on disease ecology, the pathogen, vector, intermediate host, human host, etc).

Health and Development



Good health is one of the primary aspirations of human social development

Health indicators feature prominently in human development indicators

Used as a means of measuring progress towards sustainable development

Health goals and targets prominent in the MDGs.....

"Six out of eight Millennium Development Goals can only be reached with effective malaria control in place."

MDGs by 2015 - health related targets:

- indirect < Hunger, >Education, >Water and Sanitation
- direct < Maternal Mortality
- direct < Childhood mortality
- direct < Malaria and other infectious diseases

.....with <Poverty as an overarching goal

Climate and Health

Using Climate to Predict Infectious Disease Epidemics. WHO 2005

Diseases include:	Inter-annual variability:	Sensitivity to climate#:	Climate variables:
Influenza	* * * * *	* *	(<T)
Meningitis	* * * *	* * *	>T,<H (>R)
Leishmaniasis	* *	* * *	(>T,>R)
R.V. Fever	* * *	* * *	>R (<T)
Cholera	* * * * *	* * * * *	(>T)
Malaria	* * * * *	* * * * *	(>R,T,H)
Dengue	* * * *	* * *	(>R,T,H)



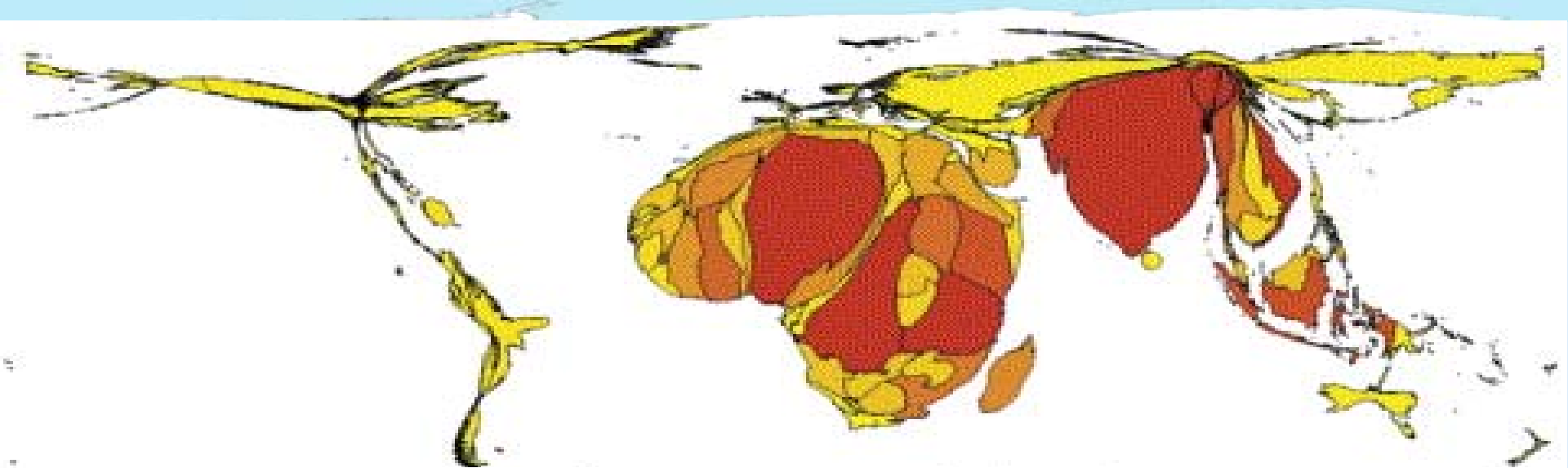
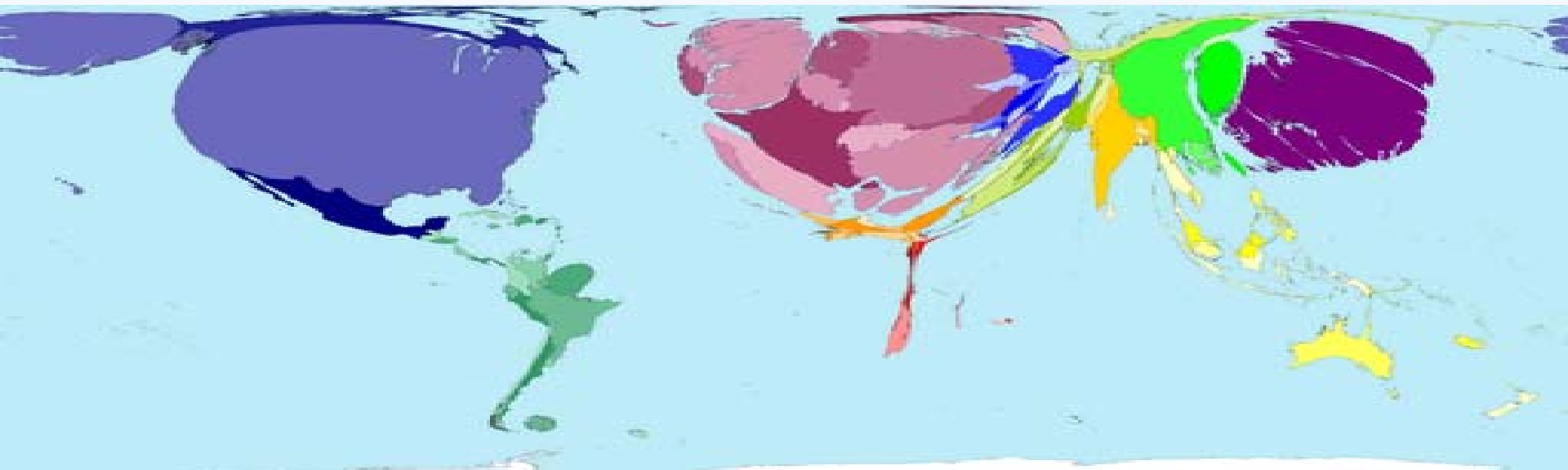
.. bacterial, viral and protozoan ..

..other candidates, e.g some respiratory and pulmonary diseases, allergies, cancers, etc. not yet included....

... must remember socio economic factors very important...



Distribution of malaria (a Tropical Disease ?)



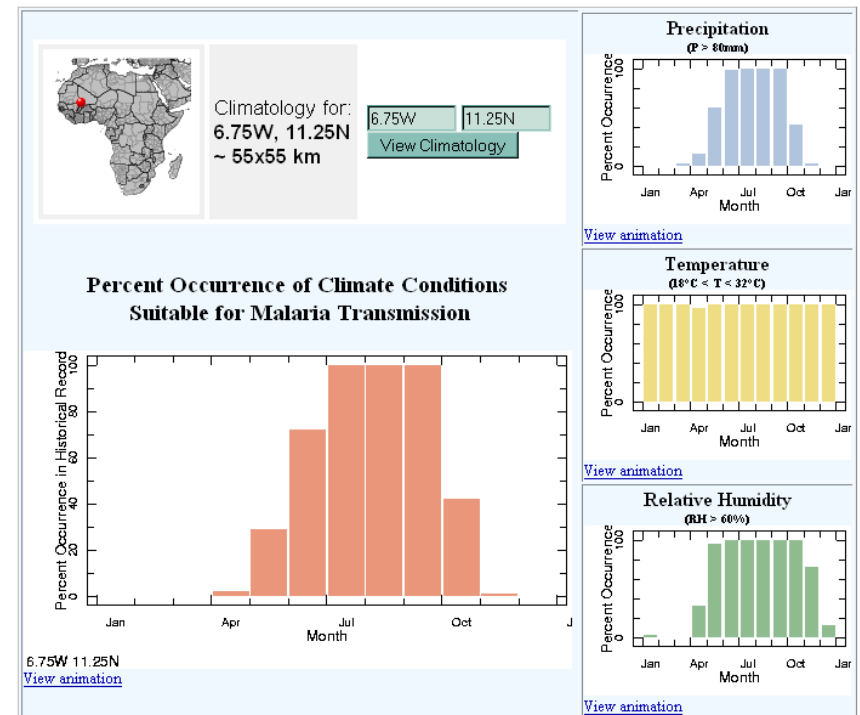
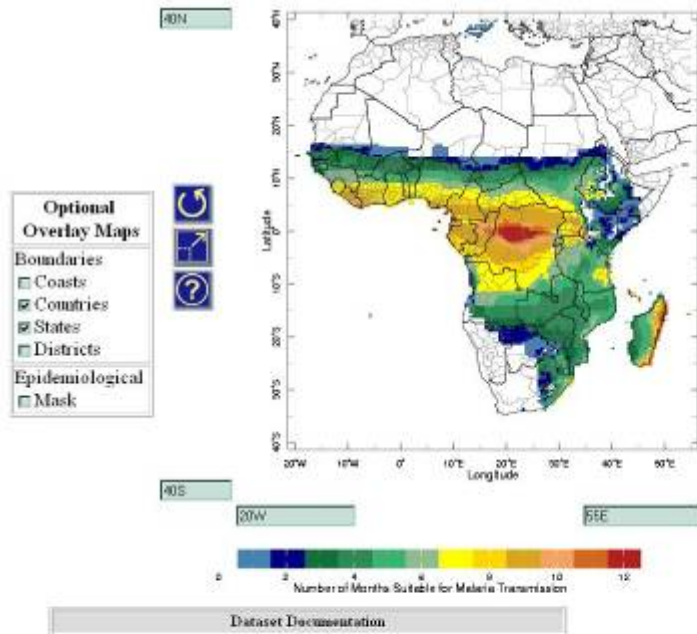
Where malaria is not adequately controlled – climate largely determines the seasonal endemicity and epidemicity of malaria

Climate and endemic (stable) malaria....

Unfortunately epidemiological data is very poor in sub-Saharan Africa.

- climate data has been used to help model and map the distribution of climate sensitive disease.

Climate suitability for endemic malaria
= 18-32°C + 80mm + RH>60%

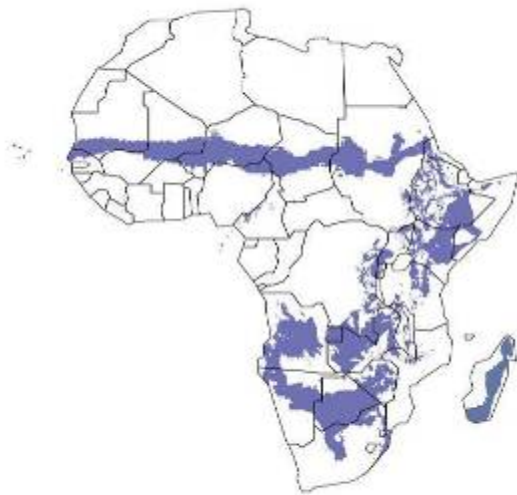


Temporal information useful for developing seasonal disease calendars for control planning purposes

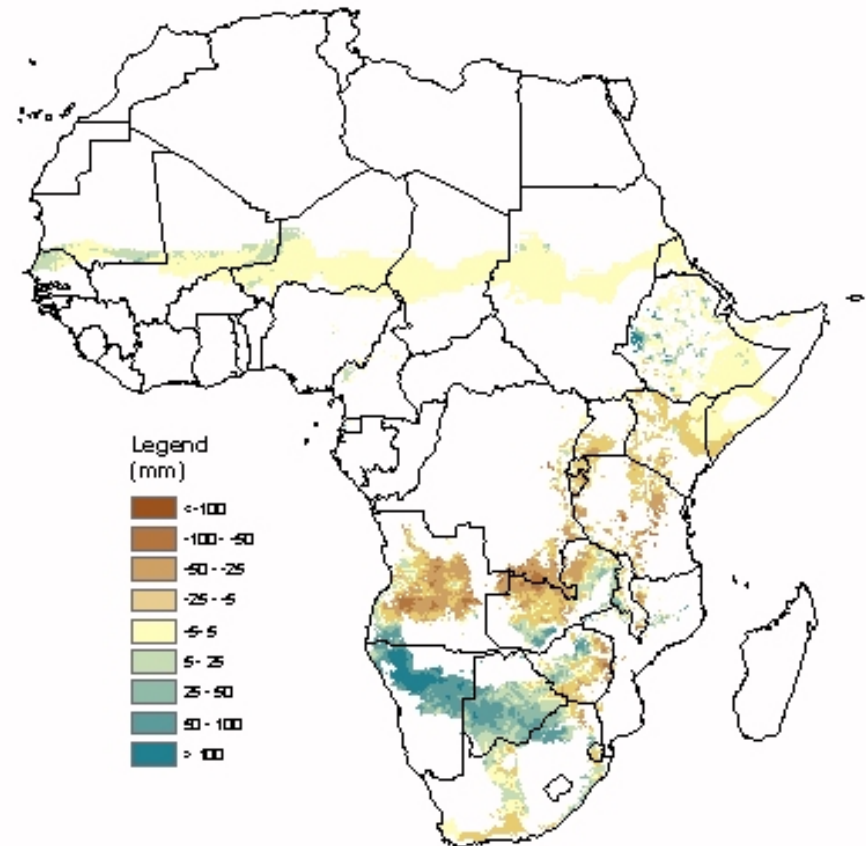
Climate and epidemic (unstable) malaria.....

For epidemics we are less interested in the 'normal' –
more interested in the 'abnormal'

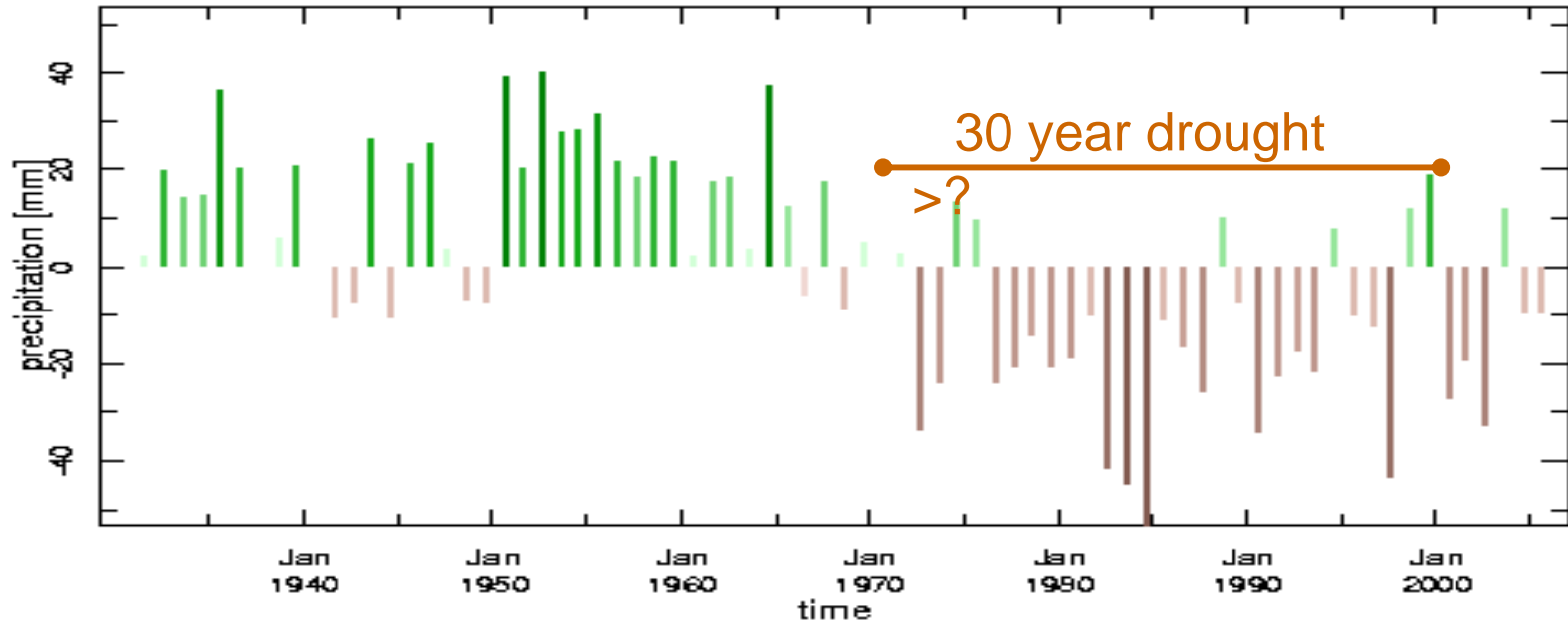
Areas at risk of epidemic malaria



Rainfall Anomalies
in
Zones with Malaria Epidemic Potential
January 21 - 31, 2006



the impact of climate trends....



West Africa provides one of the most dramatic examples worldwide of climate variability that has been directly and quantitatively measured [Hulme, 2001].

Changes in malaria

<endemicity (Faye et al 1995)

Changes in meningitis

>epidemic frequency

>southward extension of 'Meningitis Belt' (Molesworth et al 2003)

!! Very important consideration when establishing baselines !!

Demands for evidence-based health policy

Before using climate information in routine decision making health policy advisors need:

Evidence of the impact of climate variability on their specific outcome of interest, and

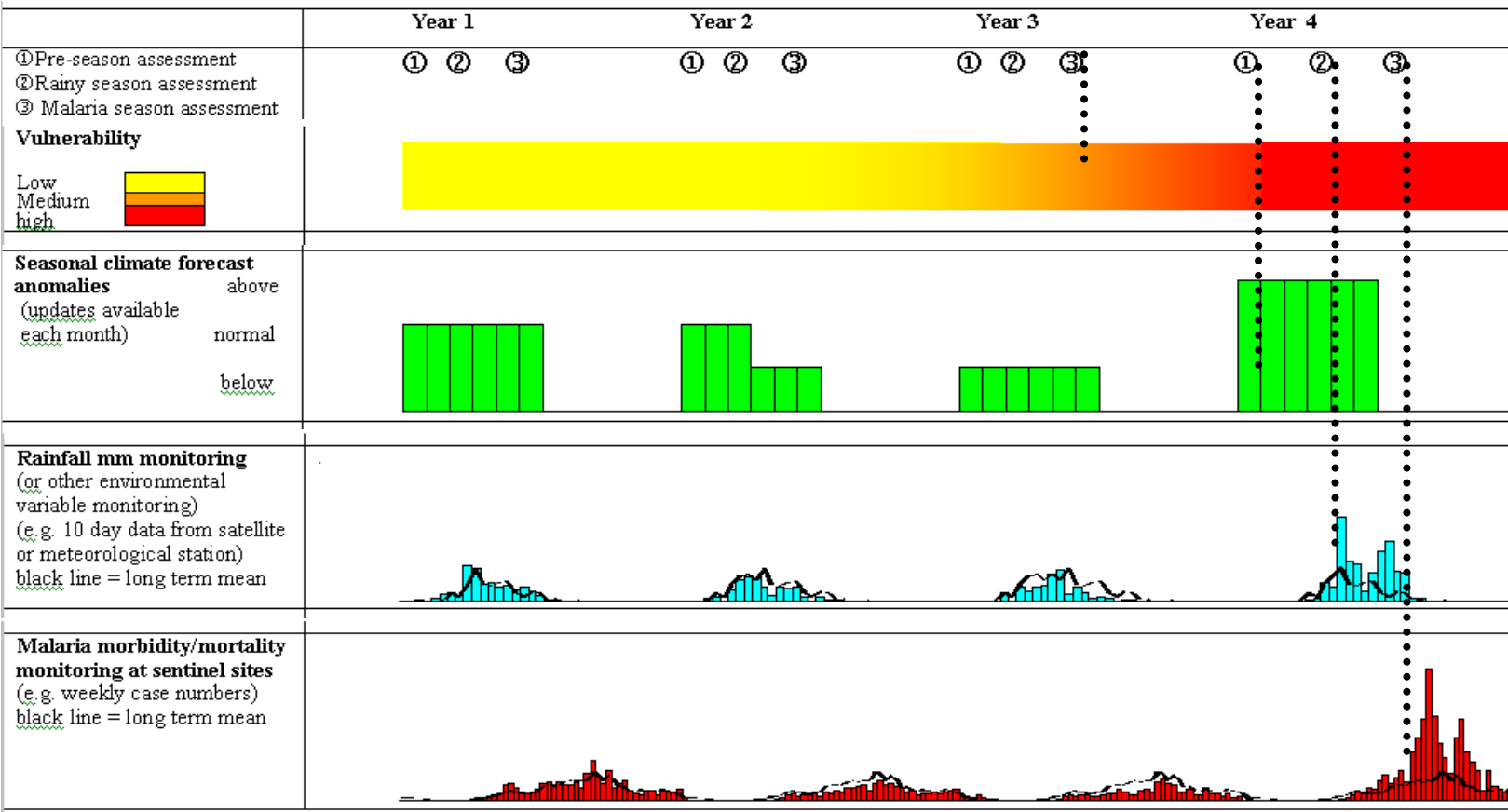
Evidence that the information can be practically useful within their decision frameworks, and

Evidence that using climate information is a cost-effective means to improving health outcomes.



Demand for integrated early warning systems..

Integrated approach gathering cumulative evidence for early and focused epidemic preparedness and response (WHO 2004)....



Flag 1 – Flag 2 – Flag 3

MEWS >>> Preventative Planning & Response

Vulnerability monitoring



Example in practice: Botswana ...

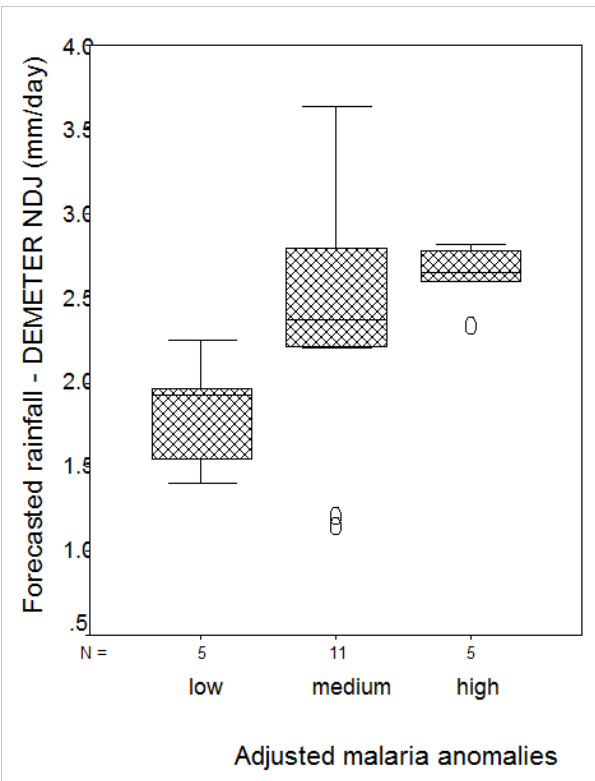
Routine assessment of drug efficacy in three sentinel sites, susceptibility of the vector to insecticides, and coverage of IRS achieved each season

Requests regular assessments of drought and food security status from the SADC Drought Monitoring Centre and disseminates the information to the epidemic prone DHTs

Recognised need for extra vigilance in malaria control programme monitoring, and surveillance among its most vulnerable groups, including those co-infected with HIV, TB, etc.

Seasonal Climate Forecasting

Example in Botswana SCF offers good opportunities for planning and preparedness. NMCP strengthens vector control measures and prepares emergency containers with mobile treatment centres

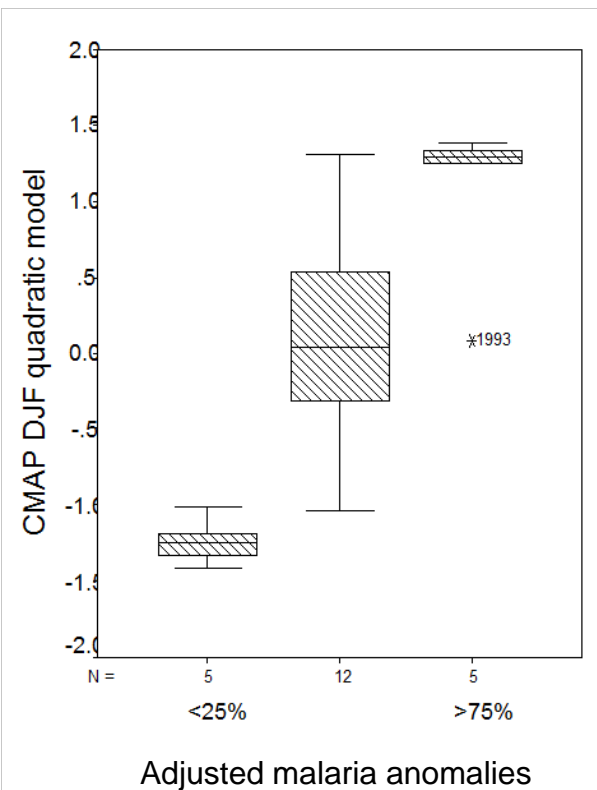


Evidence of impact of climate variability on specific outcome of interest (Thomson, et al. *Nature*. 2006)

Environmental monitoring



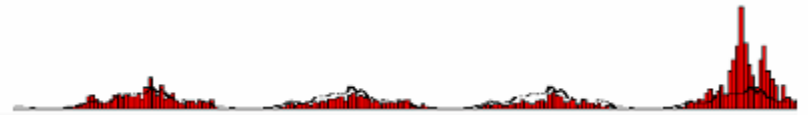
Example in Botswana ... ENV monitoring enables opportunities to focus and mobilise more localised response, i.e. vector control and location of emergency treatment centres....



Evidence of impact of climate variability on specific outcome of interest (Thomson, et al. *AJTMH*. 2005)

Evidence of timing/effectiveness (Worrall, et al. *ITMH* 2007)

Case surveillance



Example in Botswana .. Of a number of indicators (WHO 2004) the NMCP uses case thresholds defined for three levels of alert ...

OKAVANGO SUB-DISTRICT

ACTION 1: When district notification reaches/exceeds 600 unconfirmed cases/week

DEPLOY EXTRA MANPOWER AS PER NATIONAL PLAN

- ◆ Request 4 nurses from ULGS by telephone/fax
- ◆ Collect the 4 nurses from districts directed by ULGS
- ◆ Erect tents where needed
- ◆ Catchment areas to deploy volunteers in hard-to-reach areas
- ◆ Print bi-weekly newsletter to inform community about epidemic

ACTION 2: When district notification reaches/exceeds 800 unconfirmed cases/week

DEPLOY MOBILE TEAMS PER DISTRICT PLAN

- a) Each team to be up of a Nurse or FEW, a vehicle and a driver
- b) Deploy teams as follows:

TEAM AND DEPLOYMENT AREA	VEHICLE	Reg No
Team A: Qangwa area	Council	
Team B: Habu/ Tubu / Nxaunxau area	Council	
Team C: Chukumuchu / Tsodilo / Nxaunxau area	Council	
Team D: Shakawe clinic (vehicle and driver only)	DHT vehicle	
Team E: Gani / Xaudum area	Gani HP vehicle	
Team F: Mogotho / Tobera / Kaputura / Ngarange area	Mogotho HP vehicle	
Team G: Seronga to Gudigwa area	Gudigwa HP vehicle	
Team H: Seronga to Jao Flats	Boat	

- c) Deploy MO at Shakawe and 2 more nurses as per National Manpower contingency plan

ACTION 3: When district notification reaches/exceeds 3000 unconfirmed cases/week

DECLARE DISTRICT DISASTER

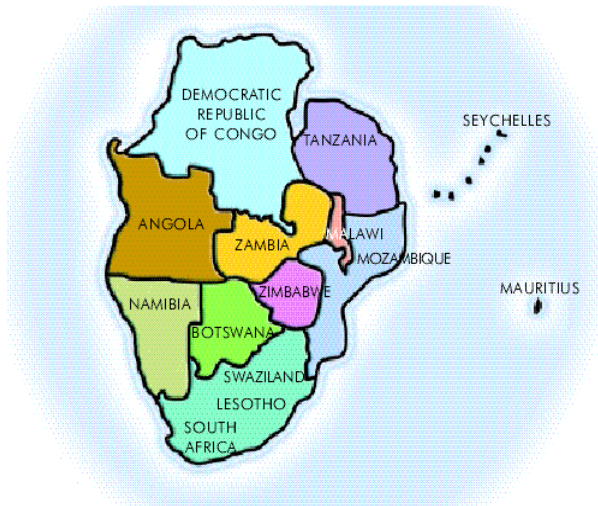
- a) Call for more outside help (manpower, vehicles, tents, etc)
- b) Convert some mobile stops to static treatment centres
- c) Station nurses at the static treatment centres
- d) Station GDA to assist nurse eg cooking for patients on observation
- e) Erect tents with beds and mattresses (6 – 10 beds/tents) at selected centres
- f) Station vehicles at selected centres
- g) Deploy MO or FNP at Seronga
- h) Station officer from MOH to co-ordinate epidemic control with DHSCC

Threshold 1- 600 unconfirmed cases/week >>> Action Plan 1.

Threshold 2- 800 unconfirmed cases/week >>> Action Plan 2.

Threshold 3- 3000 unconfirmed cases/week >>> Action Plan 3.

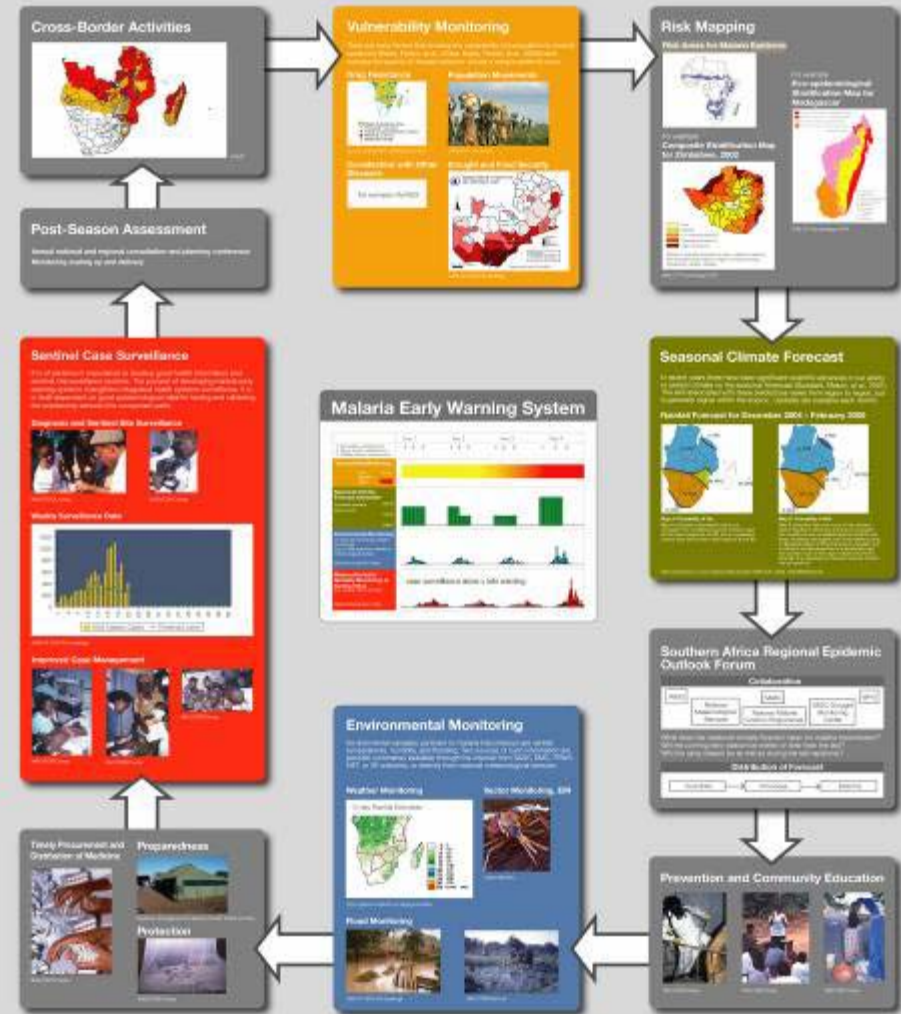
Southern African Regional Pre-Season Epidemic Malaria Outlook Forum, Harare, 2004, 2005, 2006



Evidence for practical application within a decision making framework (DaSilva, et al. 2004)

Malaria Surveillance, Forecasting, Preparedness and Response in Southern Africa

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 1. WHO (2004) Malaria surveillance and control in Southern Africa. *WHO Weekly Rep* 11: 1-11.
 2. WHO (2005) Malaria surveillance and control in Southern Africa. *WHO Weekly Rep* 12: 1-11.
 3. WHO (2006) Malaria surveillance and control in Southern Africa. *WHO Weekly Rep* 13: 1-11.
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 9. WHO (2012) Malaria surveillance and control in Southern Africa. *WHO Weekly Rep* 19: 1-11.
 10. WHO (2013) Malaria surveillance and control in Southern Africa. *WHO Weekly Rep* 20: 1-11.

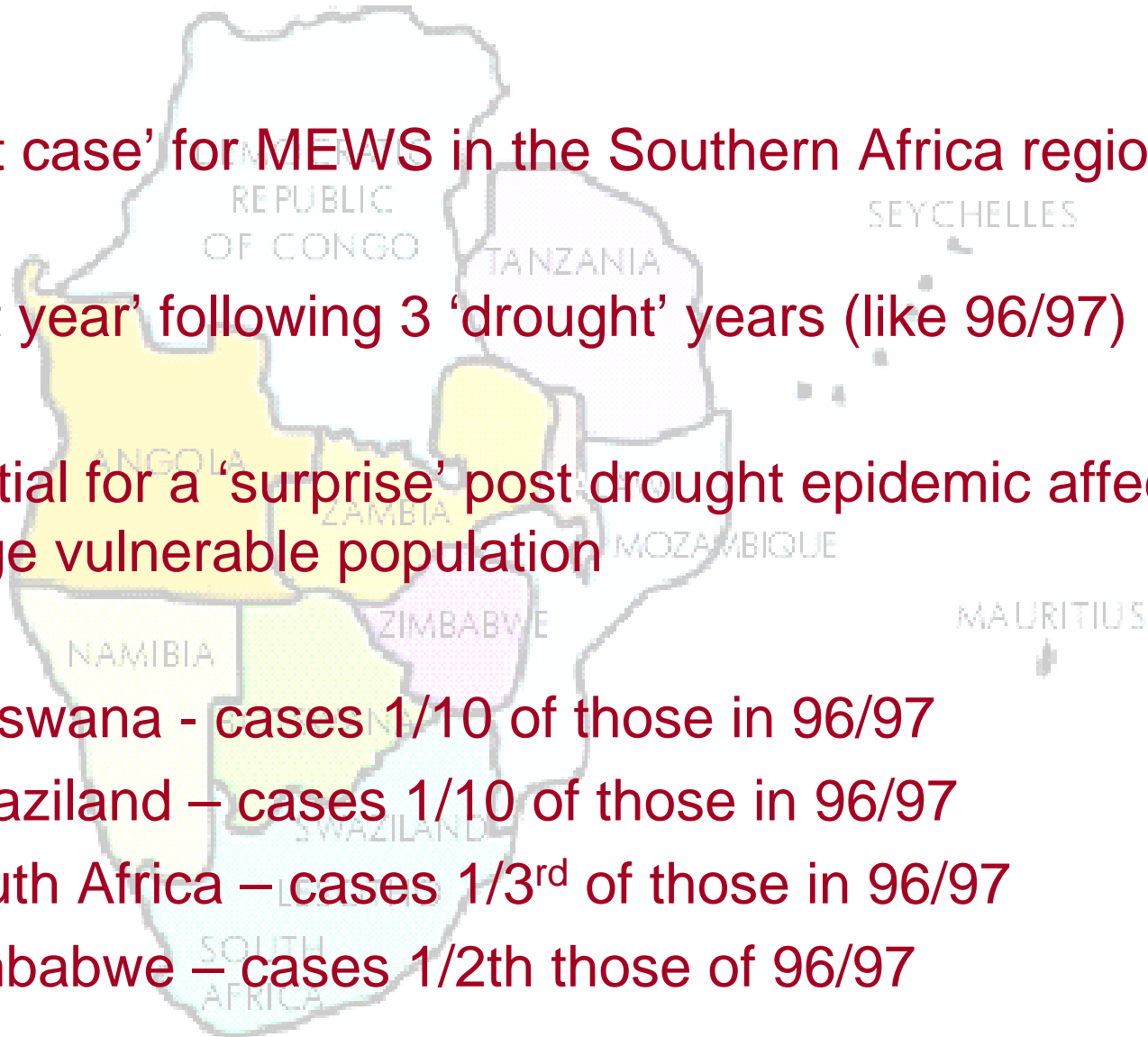
The 2005/2006 season

A 'test case' for MEWS in the Southern Africa region

A 'wet year' following 3 'drought' years (like 96/97)

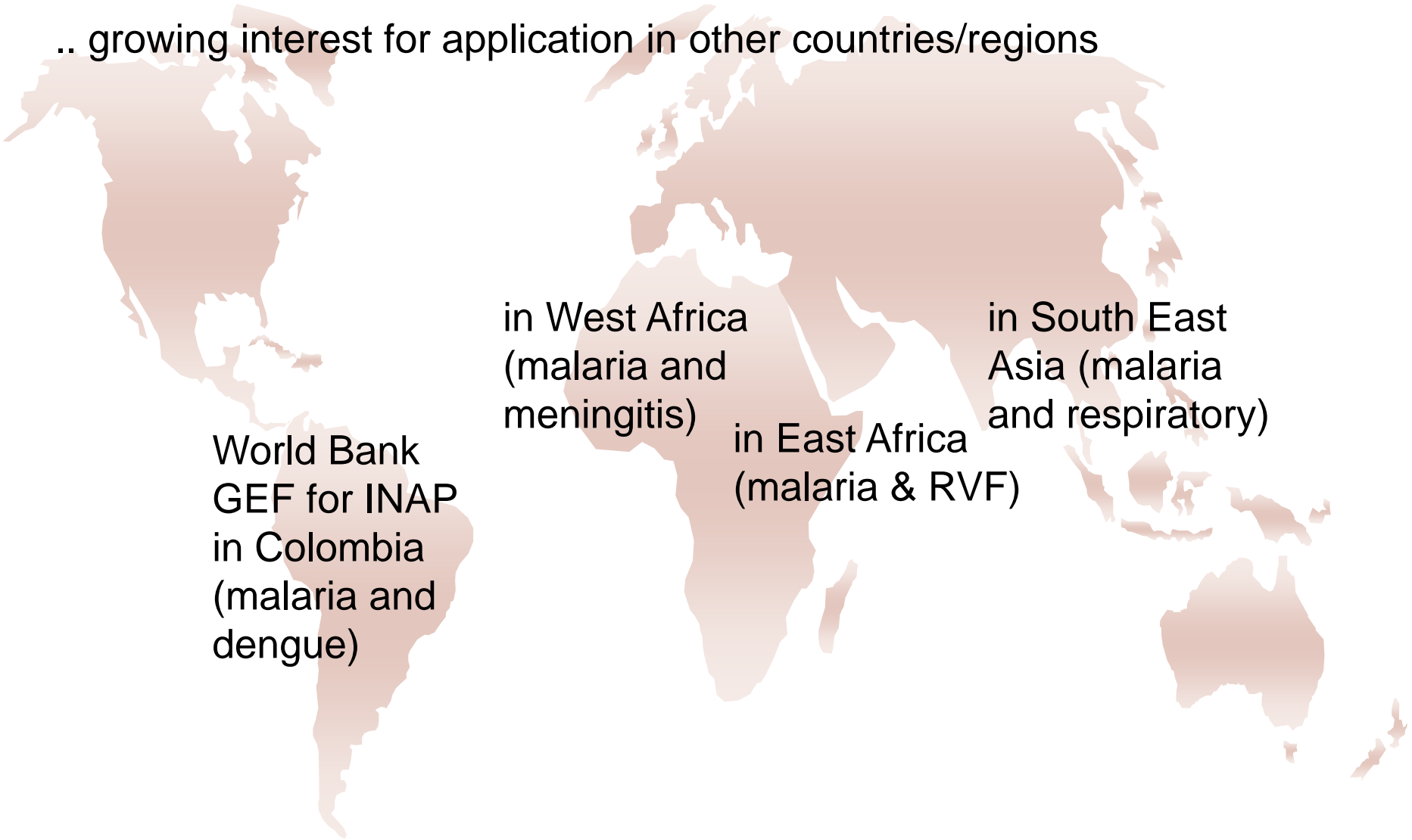
Potential for a 'surprise' post drought epidemic affecting large vulnerable population

- ◆ Botswana - cases 1/10 of those in 96/97
- ◆ Swaziland – cases 1/10 of those in 96/97
- ◆ South Africa – cases 1/3rd of those in 96/97
- ◆ Zimbabwe – cases 1/2th those of 96/97



And for application of the approach elsewhere ?

.. growing interest for application in other countries/regions



World Bank
GEF for INAP
in Colombia
(malaria and
dengue)

in West Africa
(malaria and
meningitis)

in East Africa
(malaria & RVF)

in South East
Asia (malaria
and respiratory)

Institutional issues...

Institutional (?? Global/Regional/National/District ??)

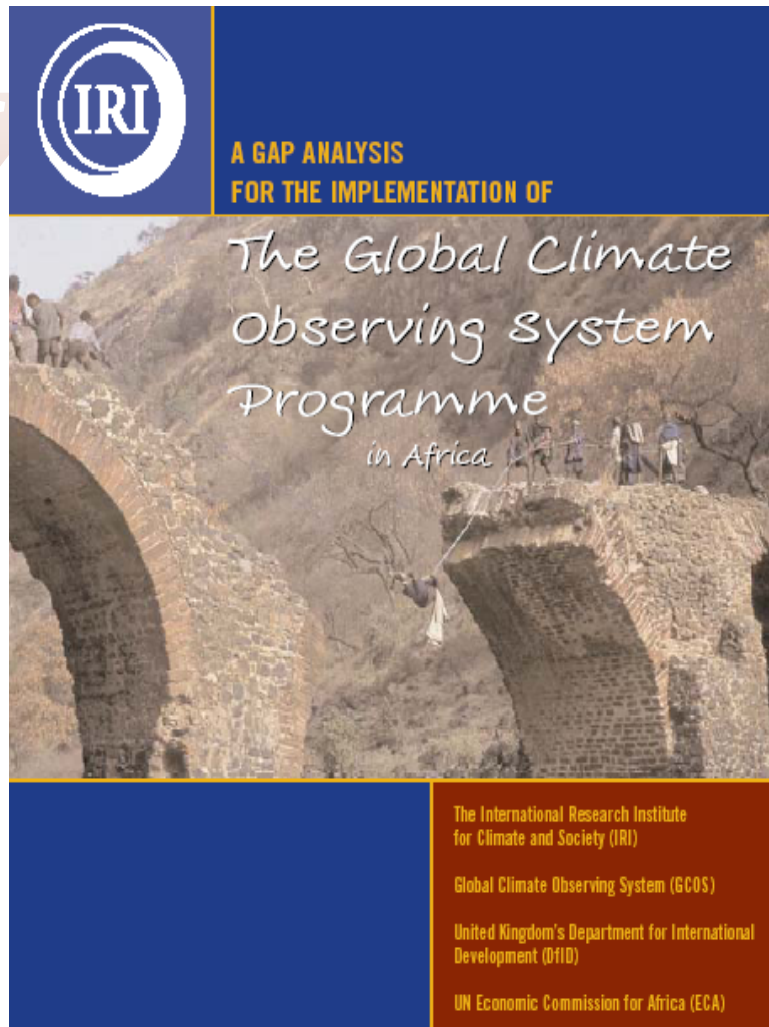
- ~ accountability
- ~ capacity
- ~ sustainability

Data – use all available data - where necessary invest in more observation data - otherwise sector users end up with sub-optimal forecasting and monitoring products.

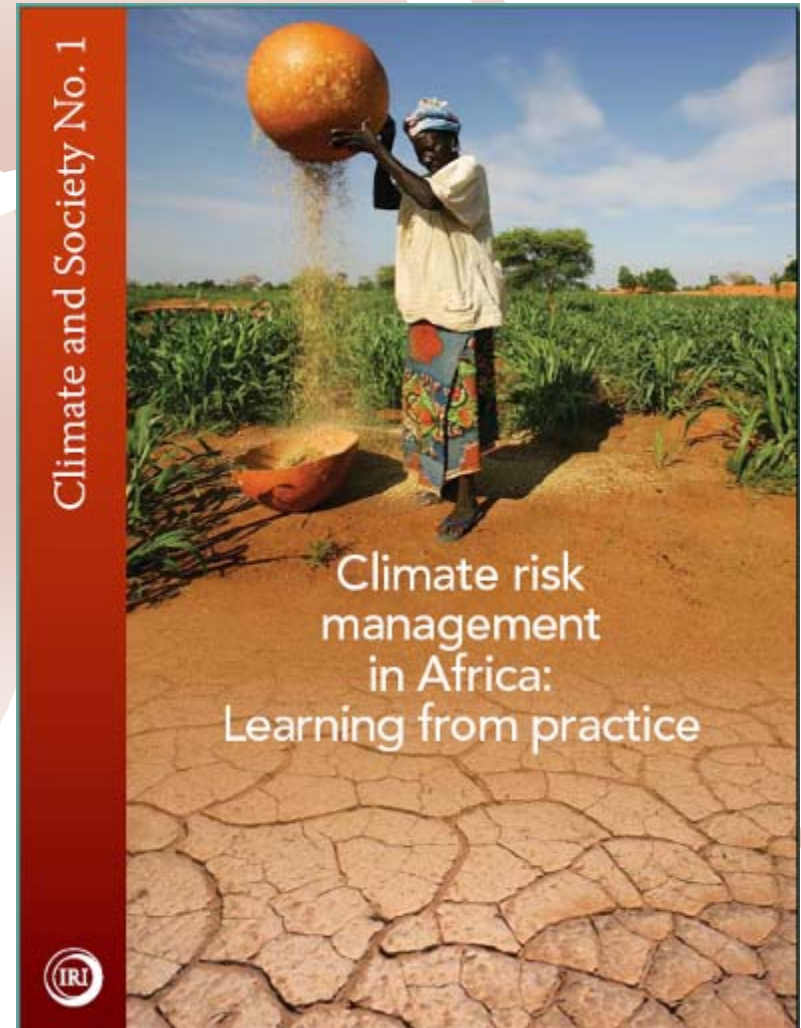
Training – trans-disciplinary requirement – few if any boundary institutions in SSA dealing adequately with climate-health knowledge generation and transfer

Need very significant medium term investment in strengthening African research, education and training establishments to supply appropriate human resource needs

Gaps and bridge building opportunities....



Towards 'ClimDev'



Managing climate sensitive disease risk in context of climate change adaptation A 2015 time frame?

Many of the MDG goals and targets (health, hunger, water, environment) are sensitive to climate variability. We need a process to use climate information today for better management of the associated risks.

- Establish firm evidence base for linkage
- Anticipate impacts (who, where and when)
- Monitor key variables and indicators
- Adapt planning preparedness and response measures according to changes in risk
- Build responsive capacity.....

For health in Africa there are the resources of the Global Fund for AIDS, TB and Malaria,

There are the wider resources of the Global Environmental Facility (GEF) World Bank, UNDP and UNEP

Post G8 Climate-Change and Africa commitments... including GCOS and ClimDev...etc.



The IPCC has identified building public health infrastructure as
“the most important, cost effective and urgently needed”
adaptation strategy for climate change (WHO-UNEP-WMO 2003)

Climate risk management for the health sector is vital to this effort

This type of no regrets action in health, and other development
sectors, is realizable and essential, both to help achieve the MDGs
and to help vulnerable communities better manage and adapt to
their varying climate.

