Joint Research Centre

8th World General Assembly of INBO

"Adapting to the consequences of climate change in basins: tools for action"

(Dakar, 20 – 23 January 2010)

Towards a pan-African Flood Early Warning System:

Experiences from the European Flood Alert System (EFAS) and pilot-testing in Africa

JRC
EUROPEAN COMMISSION

SWALIM
Somalia Water and Land Information Management

GRDC

Ad de Roo & Vera Thiemig
European Commission – Joint Research Centre
In collaboration with: ECMWF & GRDC

ECMWF

African Flood Early Warning System

Why a pan-African early warning system for floods and droughts?

Floods in Northern Hemisphere Africa 2007

- ~ 650,000 homes destroyed
- 1.5 million people affected
- 200 people drowned
- substantial economic losses

Flood risk is likely to increase due to climate change and vulnerability & exposure!

It will not prevent floods, but…

Benefit from experience with **European Flood Alert System** since 2002

Complimentary to existing systems

Warning to authorities

First discussed at WMO - Africa meeting in Nov 2006

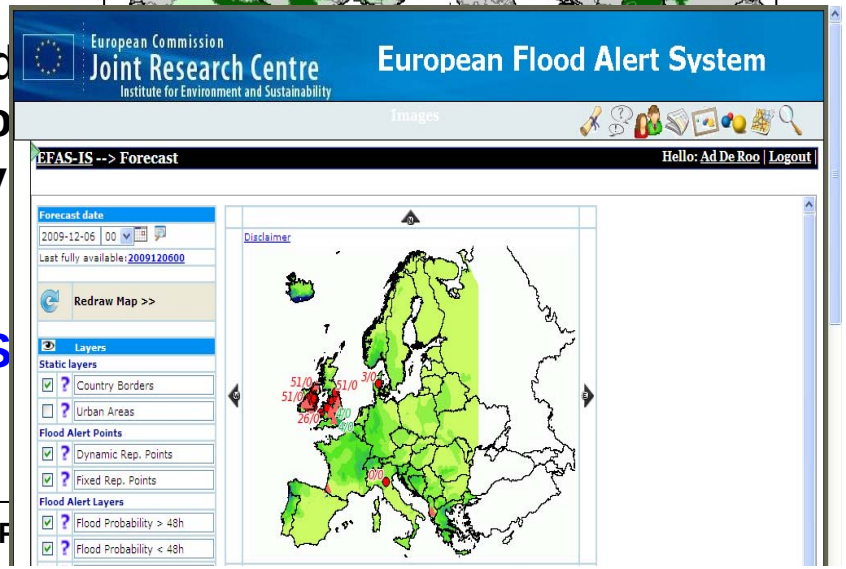
Benefits of a early warning system for floods & droughts:

- gain in response time
- better planning and organizing of prevention, protection and mitigation measures and aid for national authorities and international organisations

EFAS theoretical background

European Flood Alert System (EFAS)

- Run at EC-Joint Research Centre
- developed since 2002; pre-operational since 2005
- currently 25 partner water authorities in Europe
- probabilistic flood alert system, for river basins larger than 4000km2, with extended lead time up to 15 days (most success with 4-5 day leadtimes)
- Based on state of the art ensemble weather forecasts (120 forecasts used daily), satellite and ground observatio
- complementary system to the already existing national systems
- TWICE DAILY UPDATED
- ON-LINE ACCESS FOR AUTHORITIES
- EMAILS SENT WHEN FLOOD IS FORECASTED



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European Flood Alert System

Po flood 2009 (28-29 April)

EFAS-IS --> Forecast

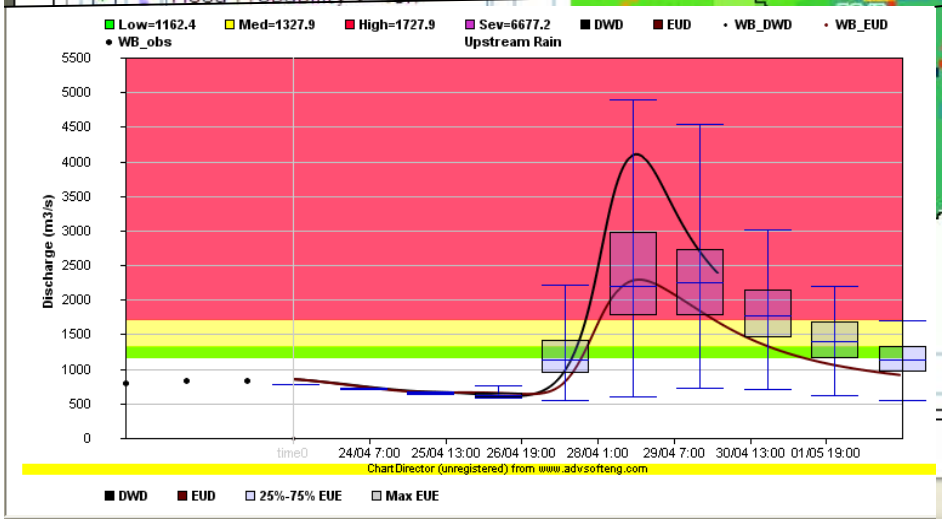
Hello: Ad De Roo | Logout |

Forecast date
2009-04-23 00
Last fully available: 2009051000

Redraw Map >>

Layers
Static layers
Country Borders
Urban Areas
Flood Alert Points
Dynamic Rep. Points
Fixed Rep. Points
Flood Alert Layers
Flood Probability > 48h

Disclaimer



Internet
100%

Towards an African system

Potentials of EFAS for African basins

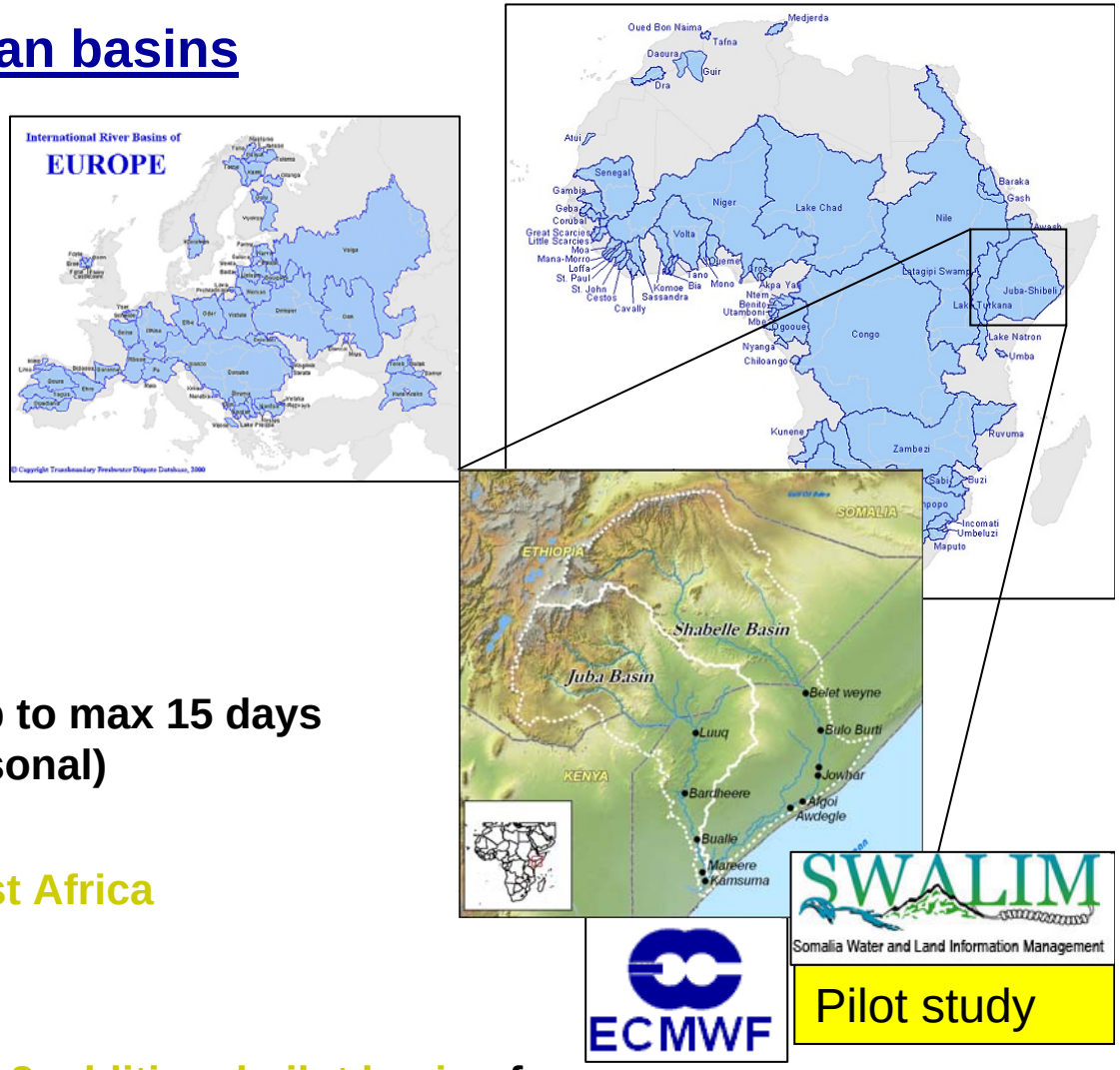
(1) probabilistic flood warning system for river basins > 4000km2

(2) can cope with a limited amount of input data

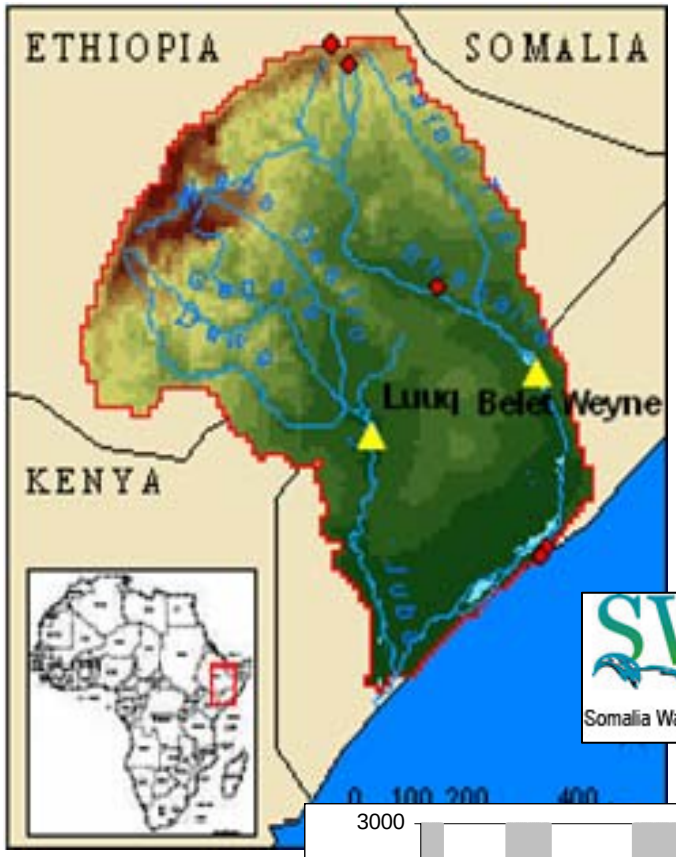
(3) increases the lead times to up to max 15 days (droughts until 1 month / seasonal)

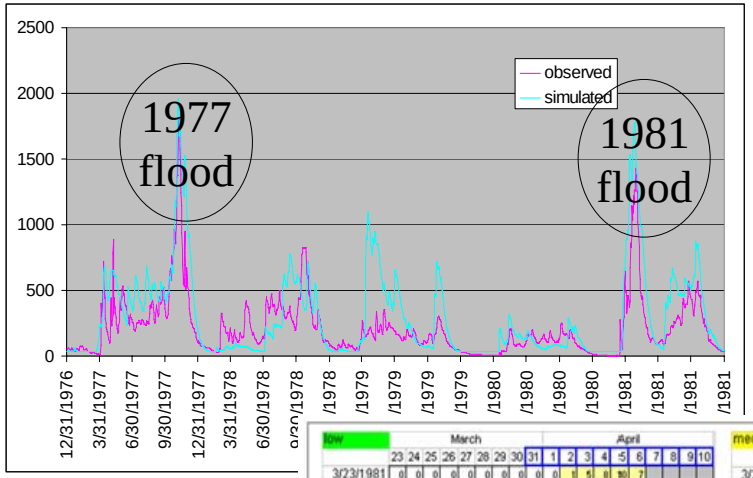
(4) First testing in pilot study East Africa

(5) Next: pan-African system and 2 additional pilot basins for in depth testing



Pilot test in East Africa: Juba & Shabelle





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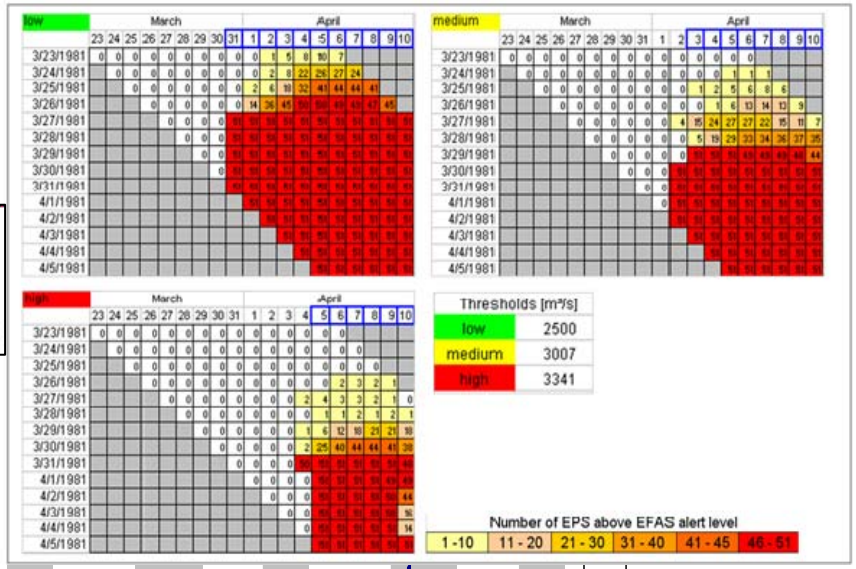

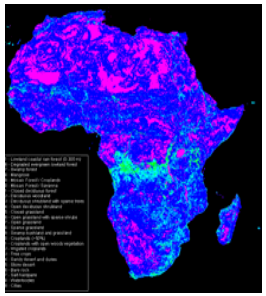

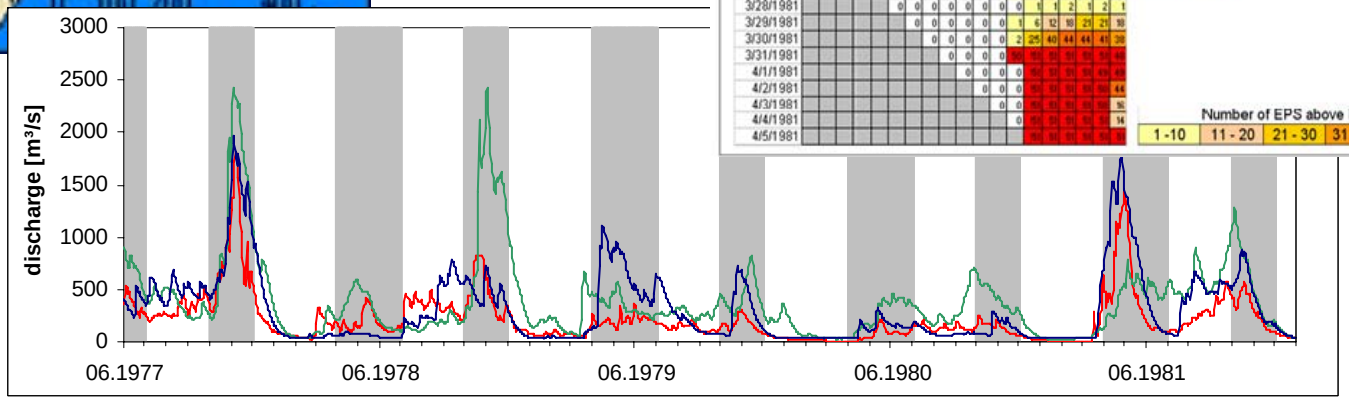

Two pilot studies:

Juba/Shabelle river basins Somalia - Ethiopia)

Zambesi river basin (Southern Africa)

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Pilot Study East Africa

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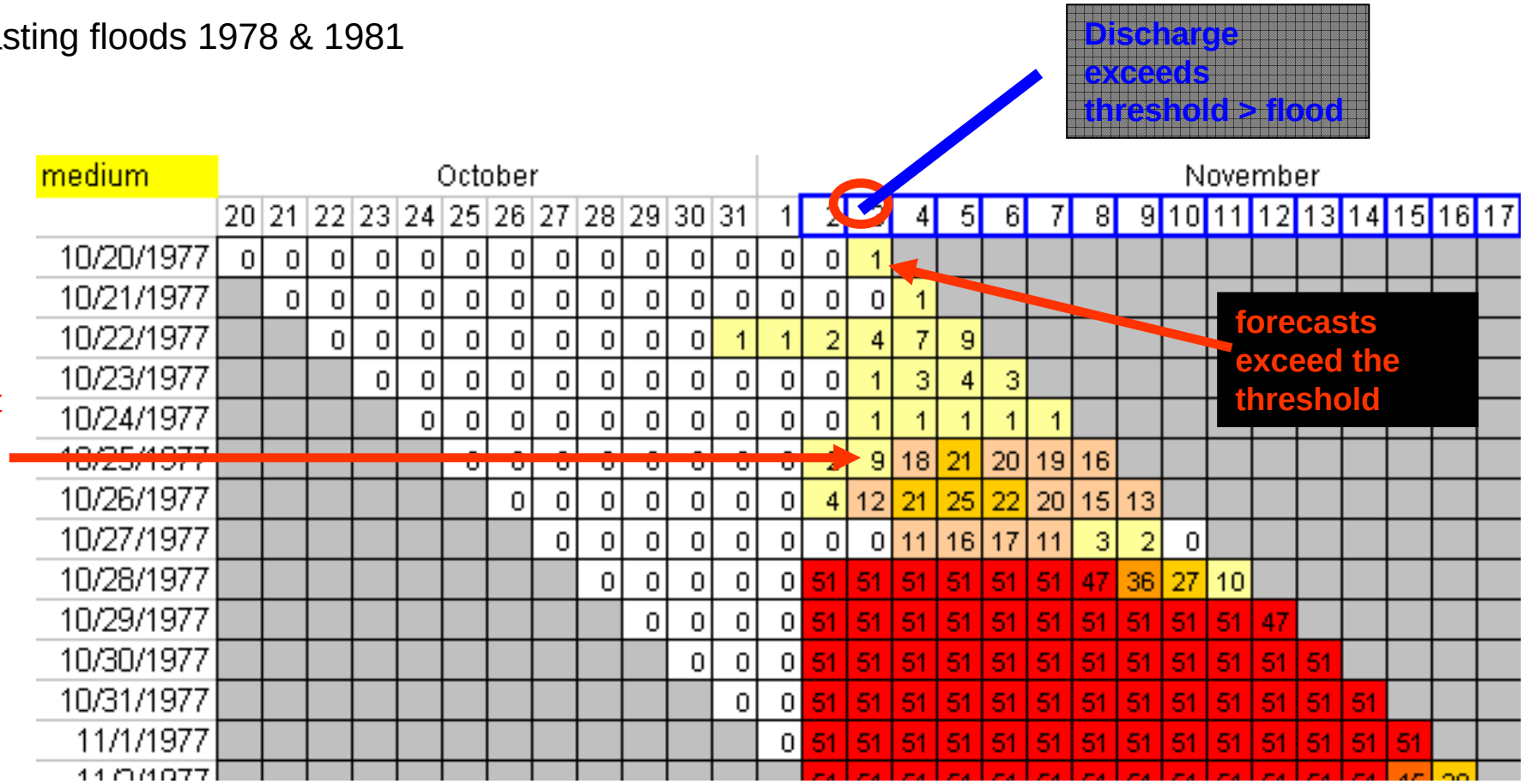
Hindcasting floods 1978 & 1981



medium	October													November													
	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
10/20/1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1														
10/21/1977		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1													
10/22/1977			0	0	0	0	0	0	0	0	0	1	1	2	4	7	9												
10/23/1977				0	0	0	0	0	0	0	0	0	0	0	1	3	4	3											
10/24/1977					0	0	0	0	0	0	0	0	0	0	1	1	1	1	1										
10/25/1977						0	0	0	0	0	0	0	0	1	9	18	21	20	19	16									
10/26/1977							0	0	0	0	0	0	0	4	12	21	25	22	20	15	13								
10/27/1977								0	0	0	0	0	0	0	0	11	16	17	11	3	2	0							
10/28/1977									0	0	0	0	0	51	51	51	51	51	51	47	36	27	10						
10/29/1977										0	0	0	0	51	51	51	51	51	51	51	51	51	51	47					
10/30/1977											0	0	0	51	51	51	51	51	51	51	51	51	51	51	51				
10/31/1977												0	0	51	51	51	51	51	51	51	51	51	51	51	51	51			
11/1/1977													0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	

- **the calibration is not yet satisfactory (quantitatively)**
- **hindcasts adopt the shortcomings of the calibration**
- **comparing hindcasts with proxy hydrological record the transferability of the methodology can be revealed**
- **system is skilful**

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Towards an African flood early warning system: way forward

- EC-JRC would like to establish this together with African basin authorities
- After the 1st pilot, we look for a second/third pilot: Zambezi (?), Senegal river (?), Niger (?) (volunteers?)
- We need your feedback, user requirements, and collaboration
  - JRC & WMO questionnaire in preparation
  - Will be distributed in the next weeks
- Envisaged partners:
  - ACMAD (African Centre for Meteorological Application to Development)
  - ANBO (African Network of Basin Organisations)
  - African Hydrological - National and Basin - Authorities
  - EC (JRC and RELEX/DEV)
  - ECMWF
  - WMO
- In return, we will provide you with flood early warnings, as well as drought warnings
- System is envisaged eventually to run in Africa

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Conclusions & Way Forward

(1) A pan-African flood early warning system using techniques developed in EFAS is feasible

(2) In Europe, since 2003 we achieved approx 5-day early flood warnings for several large river floods

(3) Both in Europe and Africa, a drought component using montlhy and seasonal forecasting is being tested

(4) The pilot study in East Africa has shown that an 5-8-day flood warning is possible, even with less available data

(5) Your contribution and involvement is essential to this ambitious endeavours through

- Other pilot studies: Zambezi?, Senegal river?, Niger?, Volta?
- Filling out the questionnaire "Current status on flood forecasting and early warning in Africa"; copies will be send and
  - online http://x-efas-is/africa_questionnaire.php)
- Building up a strong network of partners (feedback, knowledge, data)
- Participation in a meeting in autumn: further info will be distributed

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