Revision of the Strategy and Action Plan (SAP) for FFI

The main objective of the FFI is to "improve the capacity of meteorological and hydrological services to jointly deliver timely and more accurate products and services required in flood forecasting and warning and in collaborating with disaster managers, active in flood emergency preparedness and response."

Expected results according to the FFI are:

1. Improved quantitative and qualitative weather forecasting products available for flood forecasting;
2. Medium-range (2-10 days) weather forecasting and climate prediction products available for extended pre-warning information;
3. NMHSs have improved their capacity to cooperate for timely and accurate flood forecasting;
4. Integrated weather, climate and hydrological forecasting information for users.

Comments on the FFI expected results
From the expected results, it seems like FFI covers all flood forecasting ranges (horizons) – from short-range to long-range and climate predictions. At the same time, the FFI main objective is focused on flood forecasting and warning, which seems to be directed to the medium range (2-10 days). **It is very important to set the limitation of FFI in terms of flood forecasting range** – as many of the proposed actions within the SAP are about climate predictions and long-range flood predictions.

Roughly speaking, the first and second expected results are about meteorology (demand for meteorological products), the third expected result repeats the main objective of the SAP, and the last one considers the integration of all products and their availability for users.

The first two results could be grouped into one – meteorological products for flood forecasting. The third one could be focused on NHMSs to use advanced methods for operational flood forecasting and warnings. The fourth result incorporates all hydrometeorological products and, in order to relate better to the main objective, it could be focused on flood forecasts and related products available for users in advanced format (GIS-web).

Conclusions:

- it is important to set the scope of the flood forecast warning lead time (short to medium range forecast[1] limit could allow FFI to be focused on hazardous flood events, reduce the complexity of the SAP and Activity Plan, and increase its feasibility);
- revision of the FFI expected results is required – they should more strictly reflect the FFI main objective.

FFI SAP and Activity Plan

Objective of the FFI SAP is to "to produce more accurate, timely and reliable forecasts and warnings of weather, climate, and water and improve service delivery to users".

Comment: This seems to be a very broad list of objectives including forecasts of weather, climate, and water. The FFI SAP objective could be more centered on flood forecasting and related products needed for issuing flood forecasts and warnings so that it can better reflect the

[1] Short range : less than two days
Medium range: from 2 to ten days
Long range: more than 10 days

FFI Objectives. There is also concern about climate issues – the FFI objective states "…flood forecasting … emergency preparedness ..." which implies greater need for short to medium range flood forecasts. From this perspective, it is possible to centre FFI SAP on short to medium range flood forecasts lead times. For example, the FFI SAP Objective could be stated as "to produce more accurate, timely and reliable flood forecasts and warnings, related weather products, and improve service delivery to users …"

The expected results of the FFI SAP at this stage are concentrating on the first three expected results of the WMO FFI (Box 1 – page 6, SAP, 2006): improved quantitative weather forecasts for flood forecasting, available medium-range and climate predictions, and improved capacity to cooperate to jointly deliver flood forecast information (almost repeats the FFI objective).

Comment: To make it clearer and more transparent, it would be better to single out and focus attention on one main expected result of the SAP that is in agreement with the FFI expected results – "Advanced flood forecasting products and services available in NHMSs for emergency agencies and other users."

To meet the goal of the FFI, the SAP incorporates seven major Action Domains with detailed actions and three complementary Action Domains. Based on the proposed actions in the SAP for each of the Member country (Organization), a detailed Activity Plan was proposed (Annex 6, Workshop on the SAP, 2009) accounting for WMO regional needs. The capacity level of each region and prioritization of actions were considered.

Comment: Implementation steps (mechanism) of the SAP and its Activity Plan are not very clear. Who is responsible for the implementation process: WMO Secretariat or Member countries should check the list of Actions and Activities and then undertake proposed actions. There is a need to make FFI implementation mechanisms transparent (e.g. demonstration projects and documentation).

There are too many activities within each of the proposed action domains making it extremely difficult to follow and thus to implement them. One of the possible ways to improve the SAP and Activity Plan is to **select the most important actions, regrouping them into fewer Action Domains (e.g. data, forecasting models, products dissemination, capacity building) and specific actions, working with these in the future.**

Possibly based on the SAP and Activity Plan, **a list of recommendations** could be developed focused specifically on creating and implementing an operational flood forecasting and warning system, should a Member country wish to develop and implement a flood forecasting system by itself.

Implementation of the SAP seems to be the most effective in regions with demonstration projects and Flash Flood Guidance System (FFGS) implementation. As a result, the projects could be strengthened with more actions in order to better meet FFI objective.

It is necessary to discuss what the best means are to make the FFI implementation really work (e.g. demonstration projects, documentation, seminars, etc.) and thus to concentrate more attention on these means/approaches while implementing the SAP.

Proposals on further implementation of the FFI SAP
Implementation of the SAP and Activity Plan can go in two directions (have two components): developing documentation (manuals and guides) covering the SAP proposed actions, and implementing advanced demonstration projects for flood forecasting.

Overall comments on the SAP and Activity Plan

In general, without going into details into Action Domains and proposed activities, the following comments could be noted:

- some actions are not related to FFI and thus could be rejected from the SAP (for example, technical aspects about data transmission, rescue of historical data, etc.)
- a number of (quite sensible) actions repeat each other (from one action domain and to another action domain);
- a number of actions are located in an inappropriate Action Domain – there is a need to regroup actions;
- it is not obvious if there is a need to have a separate Action Domain 2 ("data exchange"), as it could possibly be added to Action Domain 1 ("Observation networks") to form a single domain "Data for flood forecasting" (as could data rescue).

There is a need to focus the SAP on the actions level. As a result, the SAP will be less broad and more shaped on FFI goals and objectives, therefore making it **more feasible and effective.**

Comments on the SAP by Action Domains

Detailed comments on the actions of the proposed Action Domains can be found in the "SAP.xls". Comments for every Action Domain are presented without going into detail on each action.

Action Domains 1 and 2

The domains are "data observation and exchange" domains. The numerous actions within the domains are to promote assessment of existing networks and to re-configure them to meet flood forecasting system requirements, using radars and satellite data, appropriate formats for data exchange, using WMO recommended instruments, among others (everything connected to observational data gathering and exchange process).

Proposals on Action Domain 1 and 2:

- Action Domains 1 and 2 could be merged into a single Action Domain "Data collection and processing";
- a number of actions repeat each other (or overlap significantly), thus they could be integrated into larger actions;
- some actions relate to another action domain.

According to the Activity Plan, the majority of actions of the Action Domain 1 are implemented at the national and regional levels using country assessments with reference to manuals. Action Domain 2 is absent in the Activity Plan.

More implementable actions could be undertaken via demonstration projects, which could pay increased attention to the present network during implementation process and, if required by NMHSs, make comments and proposals on the desirable network configuration and size for better flood forecasting (action a, e, d). For example, during the implementation of the FFGS, developers could also make estimations of the observation network and make notes (if required by NMHS) about better configuring the network for flood forecasting.

WMO documentation includes an observing network assessment and requirements for the flood forecasting system (Guide to Hydrological Practices, Manual on Flood Forecasting and Warning).

Action Domain 3 "Improvement of meteorological forecasting practices and products".

One of the main actions in the Action Domain 3 is the provision of meteorological forecast products that are necessary in flood forecasting. Key aspects of this action domain are the following: QPF of reasonable spatial and temporal resolution (need to have high-resolution QPF in mountainous regions and for small basins); medium-range forecast products; ensemble meteorological forecast products; QPE from multi-sensor sources (gauges, radars and satellites).

The majority of these actions are covered in WMO demonstration projects (e.g., SWFDP, FFGS).

Proposals on Action Domain 3:

- one of the actions that could increase the derived benefits of meteorological products is their use for flood forecasting. In the future, formulating the "hydrological requirements" of meteorological products could be achieved when undertaking demonstration projects (e.g., SWFDP & CIFDP). Specific examples include high resolution QPF for flood forecasting in mountainous areas and small basins (define resolution and other parameters), maximal lead time of meteorological forecasts to cover up to a 5 days ahead period, main elements needed for flood forecasting, etc. (at the moment, the developers of SWFDP are not fully aware of hydrological needs nor are they being taken into account when designing the SWFDP application – consequently, a lot of effort is needed to update their project parameters (design) to meet hydrological requirements).
- continue to pay attention on actions, related to QPE/QPF, medium-range forecasting, ensemble predictions, and
- it is important to establish if long-range meteorological predictions (and climate outlooks) are of concern to the FFI or not. If not, a number of actions could be removed from the Action Domain 3 (or be classified as dormant should their need arise).

Action Domain 4 "Improvement of Hydrological forecasting practices and products"

It is the most important Action Domain in the SAP and includes valuable actions on improving hydrological forecasting capacities of NMHSs.

The implementation of the Action Domain actions was done so far by developing and implementing FFGS, and formulating and issuing a number of WMO publications (i.e., Manual on Flood Forecasting and Warning).

The biggest gap in the Domain is the absence of a demonstration project aimed for short to medium range forecasting on basins larger than 100-150 km^2 (FFGS upper range).

Proposals on Action Domain 4:

- finalize WMO document on Flood Forecasting Model selection (for short-range forecasting);
- develop or upgrade existing demonstration projects for short to medium range flood forecasting (e.g., progress in flood forecasting activities in coastal areas by introducing riverine hydrological modelling in CIFDP project);
- continue to support NMHSs with documents about engaging in and improving operational flood forecasting capacity (e.g. develop a document in addition to the Manual for Flood Forecasting and Warning, that would be centered on developing the flood forecasting and warning system).