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EXECUTIVE REPORT
FANFAR Workshop 3
@ Hotel De Bently, 10–14 February 2020, Abuja, Nigeria

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Summary

The FANFAR project (reinForced cooperAtion to provide operatioNal Flood forecasting and Alerts in West AfRica), funded by the European Commission (2018–2020), aims to foster reinforced cooperation between key West African and European organisations. The project focuses on developing a system according to West African user needs and priorities, identified through a set of workshops. The third workshop was hosted by the Nigerian Hydrological Services Agency (NIHSA) and took place at Hotel De Bently (2020.02.10–14), in Abuja, Nigeria. In total, the workshop hosted 58 participants, including the consortium partners. Additionally, two representatives from the World Meteorological Organisation (WMO), who are FANFAR advisory board members, were present the entire week. At the opening session, the director general of NIHSA, the director general of AGRHYMET, the head of economic cooperation & energy at the EU delegation to Nigeria and ECOWAS, and the Swedish Ambassador to Nigeria were also present. The workshop even made it to the national Nigerian TV and newspapers (AIT news, Nigerian Pilot, Sundiata Post). The representatives from hydrological agencies and emergency management agencies on the regional and national level from 16 countries in West Africa contributed substantially to achieve the project goals.

In this workshop, the main objectives were to 1) share and discuss user experiences with the FANFAR forecasting system during the 2019 rainy season; 2) summarise the technical developments of the pilot forecasting and alert system; 3) practice on how to use the system; 4) review the stability of user objectives and preferences; 5) refine communication strategies of FANFAR outputs; 6) prepare to test the system during 2020; and 7) advance toward long-term sustainability. The full workshop Agenda and presentations are available at the FANFAR Knowledge base[1].

We discussed user experiences using short flash presentations from each country and organisation, who all presented their experience in the same template. Furthermore, an updated survey concerning experiences during the rainy season and the use of flood forecast systems was taken (similar to workshop 2). We summarised the technical developments and carried out several hands-on sessions to practice on how to use the system. Technical system feedback was collected with the same questionnaire as in workshop 2. The stability of objectives and preferences were evaluated using the same intervention that was done during workshop 2. Thereafter, the results concerning user preferences on objectives (collected in previous workshops) and the resulting best system options were presented. These results were calculated with Multi-Criteria Decision Analysis (MCDA). To design effective communication and response strategies for FANFAR information, two intensive half-day interactive sessions were organised with emergency managers. A strategy was formulated on how to test the system during 2020. Finally, to advance toward long-term sustainability, a session highlighting gender and human diversity was arranged, along with a discussion on other important factors for sustainability.

[1] https://knowledge.terradue.com/pages/viewpage.action?pageId=24674773

1. Introduction

FANFAR (reinForced cooperAtion to provide operatioNal Flood forecasting and Alerts in West AfRica) is a project funded by the European Commission (2018 – 2020) with the overall aim to provide a flood forecasting and alert pilot system for West Africa, through reinforced cooperation between key West African and European organisations (http://fanfar.eu/). A key focus of the project is to develop the system according to West African user needs and priorities, identified through a set of workshops. After the first workshop in Niamey, Niger (September 2019), and the second workshop in Accra, Ghana (April 2019) from 10–14 February 2020, the third workshop took place in Abuja, Nigeria. Local host was the FANFAR consortium partner, the Nigerian Hydrological Services Agency (NIHSA).

The main results regarding work package 2, i.e., the co-design process of the FANFAR system together with the users, are reported in this document. Around 30 representatives from hydrological agencies and emergency management agencies on the regional and national level from 16 countries in West Africa contributed substantially to achieve the project goals. The country representatives came from Benin, Burkina Faso, Cape Verde, Gambia, Ghana, Guinee, Guinee Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Sierra Leone, Chad, Togo, and Senegal. Furthermore, representatives from the Niger Basin Authority (NBA), Volta Basin Authority (VBA), Lake Chad Basin Commission (CBLT) and the Organisation for the Development of the Gambia River (OMVG) also participated. Finally, two representatives from the World Meteorological Organisation (WMO) and one representative from the Economic Community of West African States (ECOWAS) visited the workshop in the capacity of FANFAR advisory board members. The FANFAR workshop 3 welcomed 58 participants from 20 countries, including the consortium members from Europe. At the opening session, the director general of NIHSA, the director general of AGRHYMET, the head of economic cooperation & energy at the EU delegation to Nigeria and ECOWAS, and the Swedish Ambassador to Nigeria were also present. The workshop even made it to the national Nigerian TV and newspapers (AIT news, Nigerian Pilot, Sundiata Post)[2].

The aim of the third workshop was to further consolidate and expand the co-design process of the flood forecasting and alert system and to review and learn from user experiences gained during the 2019 rainy season. After the opening session, the workshop started with presentations from every country and regional organisations concerning the severity of floods in the rainy season and their experiences with the FANFAR flood forecasting and alert system. The co-design process included structured gathering and discussion of feedback on the user experiences, explanation of the knowledge base and support help desk, hands-on showcasing of the updated system, different exercises using the FANFAR system by the participants and collecting feedback on its technical aspects. Furthermore, it included continued assessment of objectives and preferences regarding the FANFAR flood forecasting and alert system, and co-development of communication and response strategies. From those activities, the main goals were:

- To learn about the severity of floods during the 2019 rainy season in different West African countries and regions and to share and discuss the user experiences and accuracy of FANFAR forecasts over the past year (Section 2);

[2] https://www.facebook.com/OfficialAITlive/videos/193610395351050/
https://sundiatapost.com/ecowas-swedish-institute-implement-project-to-mitigate-flooding/

- To report progress on system components and build capacity on the updated flood forecasting system components by carrying out practical sessions where participants actually used the FANFAR system (Section 3);
- To continuously improve the FANFAR flood forecasting system using structured feedback (Section 4);
- To assess the user preferences and the stability of the importance that participants previously assigned to the objectives for the development of the operational flood forecasting and alert system (Section 4);
- To refine communication format of information generated by the FANFAR forecast system as well as inform distribution channels and response strategies (Section 5);
- To prepare to test the system during the 2020 rainy season (Section 6);
- To advance toward long-term sustainability of the FANFAR system (Section 6).

2. FANFAR user experiences

Participants' experiences with FANFAR were collected, shared and discussed on three occasions; once during the rainy season 2019 preceding the workshop and twice during workshop 3 itself. During the rainy season, participants were contacted by FANFAR consortium members to answer questions about their use of the FANFAR system on the topics of the frequency and reason of (non-)use, the accuracy of forecasts and participants' experience with floods. These questions were identical to those asked in an experience survey during workshop 2 (April 2019), which preceded the rainy season. At the start of workshop 3, all participants were asked to present their experiences with floods and with using the FANFAR system during the 2019 rainy season, using identically structured flash presentations of 10 minutes each (Figure 1). This session started with a short presentation of the results from the experience survey taken during workshop 2, mentioned above.

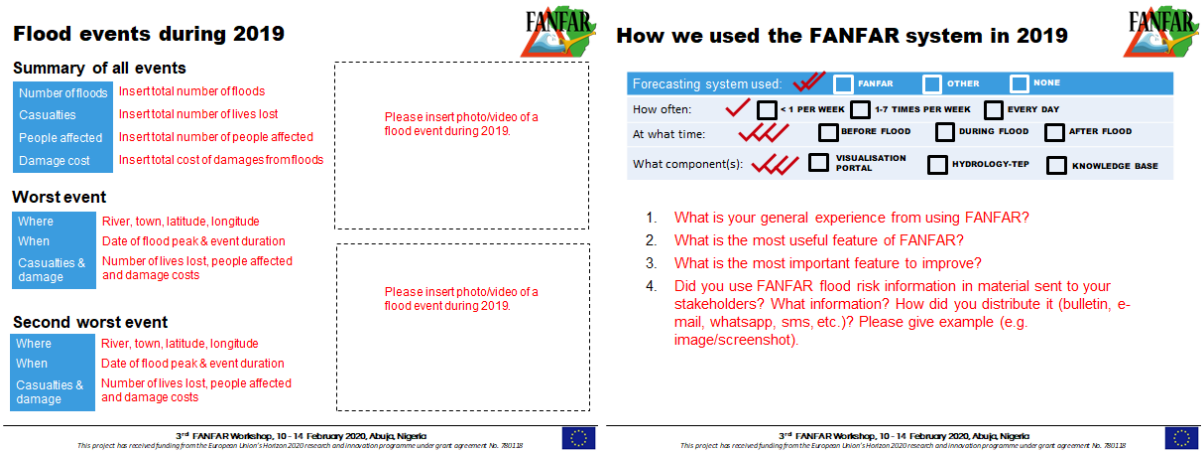

Figure 1 Two slides from the standard template participants filled out to share their rainy season experiences.

Overall, many countries experienced severe flooding, that killed many and affected hundreds to thousands of people. The main exception was Cape Verde, which suffers from a severe drought. While the location of floods were quite well captured by the FANFAR system, the timing of peak was often too early or too late and the magnitude under- or overestimated. In some countries, the FANFAR system generated false alerts. While 10 used the FANFAR system regularly and regarded it as useful, the remaining six countries had not used it. Reasons include the lack of accuracy, internet problems, missing human resources and the use of other systems. Indeed, most important suggestions for improvement include better accuracy, as well as adding extra information such as water level and name where hazard

occurs. Those who did use the FANFAR system indicated their appreciation for its simplicity and user-friendliness, the quality of the Interactive Visualization Portal (IVP) and hydrograph as well as the option to download current forecasts. Generally, participants reported a strong willingness to use the FANFAR system during the 2020 rainy season and high appreciation for the continuous improvements made by the FANFAR development team. The individual user experience from each participating organisation is available at the FANFAR Knowlede Base[1].

Finally, during two moments in workshop 3 (one towards the beginning and one towards the end), participants filled out an (updated) experience survey; similar to those provided during workshop 2 and the rainy season.

3. Progress on system components and capacity development

All participants were introduced to the technical developments of the FANFAR system, and the planned developments ahead[3]. Particular focus was placed on the Interactive Visualisation Portal, the information derivation, and the support system, because these components are critical for understanding and using the system. Two practical hands-on exercises were carried out in which all the participants trained on how to use these components in their region of interest (Figure 2).

Figure 2. Hands-on practice session with FANFAR's visualisation portal.

3 https://knowledge.terradue.com/pages/viewpage.action?pageId=24674773&preview=/24674773/24675475/Jafet_FANFAR%20system%20overview%20%26%20prioritized%20functionalities.pdf

Subsequently, the hydrologists from all participating countries received a summary of the progress on all underlying technical components (Local hydrological observations, EO water levels, meteorological data, hydrological modelling, and the Hydrology-TEP services and system). This included an assessment of the current accuracy of the forecasting system, as manifested during the past three years (Figure 3).

A set of hands-on training sessions were held to practice with the system, to assess quality, and to suggest refinements. The exercises centred on Hydrology-TEP access and navigation, quality assurance of local observations, accessing current and past hydrological forecast data, estimating water levels using satellite data, and analysing forecast outputs. All material and exercises are available on the FANFAR knowledge base[1]. Overall, the sessions were fruitful and well-received by the participants.

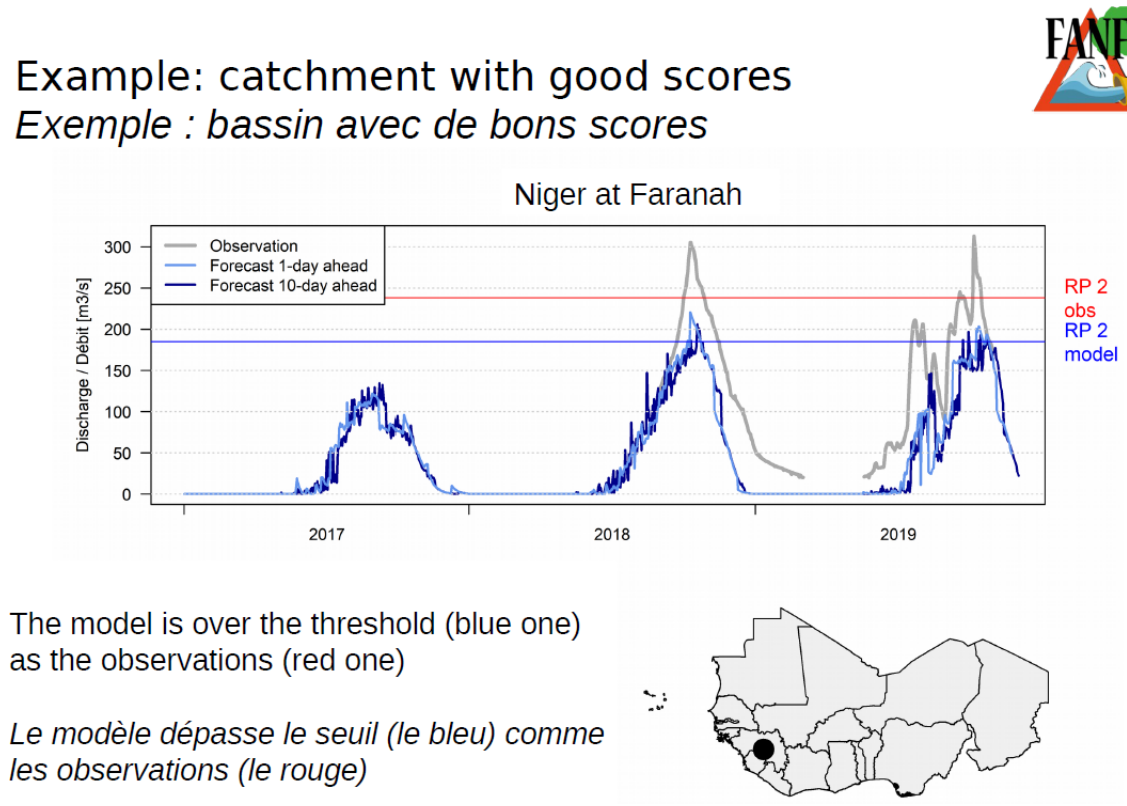

Figure 3. Example assessment of forecast accuracy at the Faranah gauge in Guinea[4].

In line with previous workshops, feedback on all technical components were collected using a technical feedback form. This form allowed participants to rate any aspect of the technical system, explain their rating and make suggestions for improvement. The form was handed out to the participants at the start of the workshop, and time for filling it out was provided after each technical session.

[4] https://knowledge.terradue.com/pages/viewpage.action?pageId=24674773&preview=/24674773/24675482/LS-Day-3-HYPE-modelling-progress.pdf

4. Preferences, importance and stability of objectives

For the third time, after workshop 1 and 2, the participants' preferences concerning the achievement of objectives of the FANFAR flood warning and alert system, and their perceived importance were assessed. Participants were once again asked to rate and rank the importance of the objectives as agreed upon during the Multi-Criteria Decision Analysis (MCDA) process of workshop 1 (September 2018 in Niamey, Niger), and add new objectives where they saw fit. The same objectives ranking form used during workshop 2 (April 2019 in Accra, Ghana) was used again during workshop 3. For a considerable proportion of the participants, this was the first time they filled out this form, as they were first-time participants. To help new participants understand, and to refresh the memory of the returning participants, a brief presentation of the objectives preceded the form handout. Furthermore, a document containing detailed explanation of each objective was distributed to participants.

After the participants had filled in the survey form, the results of the MCDA from workshops 1 and 2 were presented. In workshop 2, the preferences were elicited in detail from five groups following standard MCDA methods. Over all five groups, there were some similarities, but also considerable differences concerning the importance of objectives. Quite clearly, on the higher level of the objectives hierarchy, the objective "High information accuracy and clarity" was perceived as most important (Figure 4). However, there were strong differences between groups concerning the importance assigned to the lower-level objectives.

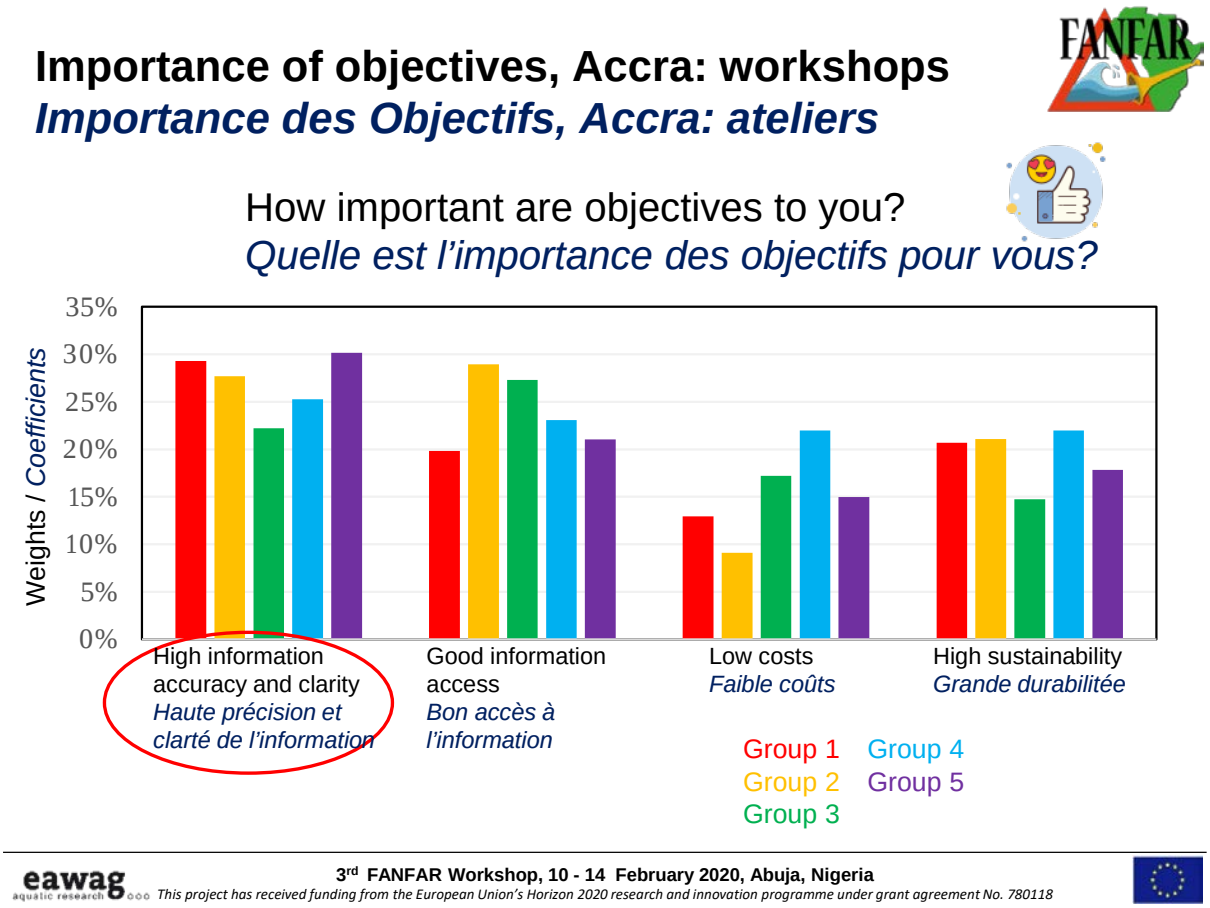

Figure 4 Importance of the higher-level fundamental objectives for the FANFAR system. Importance weights were elicited in five groups from participants in workshop 2 (April 2019 in Accra, Ghana).

Even though the different groups had different preference concerning the importance of objectives, the MCDA results indicate that it is indeed possible to find configurations of the FANFAR system (termed “options”) that well achieve the preferences of *all* the different user groups. A set of eleven FANFAR system options had been developed together with the participants in workshop 1; and had later been refined by FANFAR consortium members. An option that performed consistently well over all five user groups, despite their differing preferences, is an option that “uses the least resources for users”. Another option that mostly performed well over all groups was an improved “calibrated model that uses Earth Observation data”, and a third option was a “most robust system” option. These results from the MCDA modelling can now be used by the FANFAR system developers to further refine the system according to the users’ needs and preferences.

5. Risk communication and response strategies

To optimise the representation of risk information from the FANFAR system for its primary users, as well as the communication towards the general public, a day-long session was organised with emergency managers from the participating countries. This session contained two parts; the first part focussing on effective representation and communication of FANFAR system outputs, the second part focused on the identification of relevant downstream stakeholders for information dissemination as well as appropriate response actions.

During the first part, participants were introduced to the three main aspects of risk communication: content (of the message), format and channel. Each of these three categories covers a number of options. Participants were then introduced to FANFAR forecast scenarios, which varied in time (0–10 days before flood), severity (level 1–3) and location (capital – rural area) of the forecasted flood. The emergency managers then indicated how “suitable” they considered each option listed in a table for communication from the FANFAR system to them, as well as for communication from them to the general public.

Immediately after the session, participants filled out a short evaluation survey to assess their understanding and opinion on the session. The results from this survey showed that the participants understood the tasks they were given, and were confident about their answers (5.33 on a scale from 1: not at all confident, to 6: very confident). They very much enjoyed the session as well, rating it 5.42 on a scale from 1 to 6 (1: not at all enjoyable, 6: very enjoyable).

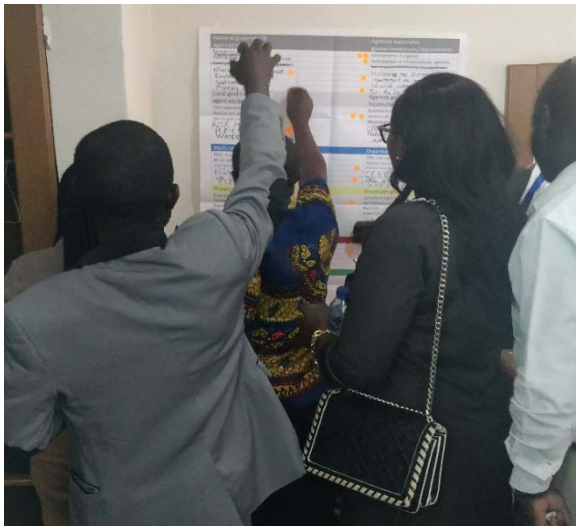

Figure 5 Voting on the most important stakeholders.

During the second session of the day, the group collectively established the most important downstream stakeholders that are part of the so-called action response chain. This was achieved by adding stakeholders to a preliminary stakeholder list in couples, followed by a plenary discussion. The updated list was added to a poster, which enabled voting to decide the eight most important stakeholders. Participants voted by sticking round labels next to their choice of stakeholders (Figure 5).

The next part of the second session had a similar format, but focusing on actions (responses) that could be taken by the

stakeholders. Again, participants were asked to add to a preliminary list of actions first individually, and then in the plenum. The information gathered during this session will help shape a more advanced action-response type of session, to be held during workshop 4.

Similar to the first session, the participants filled out an evaluation form at the end of session two. Again, they reported high confidence with their answers (5.6) and high enjoyment of the session (5.1). Participants were very actively involved in the sessions, evident from the passionate discussions that took place during the plenary stages.

6. Actions during 2020 & beyond

All participants were invited to test the system during 2020 and to continue to contribute to improve it. A strategy was formulated on how local hydrometric observations shall be supplied to the system on an operational basis in order to allow real-time adjustments of the forecast system. Moreover, a process was initiated to define a day-to-day operational protocol by which hydrologists and emergency managers can carry out systematic tests of the system during the 2020 flood season.

Since many West African organisations find the FANFAR system useful, and would like to continue using it in the future (Section 2), a set of sessions were carried out aiming toward long-term sustainability, beyond the end of the project in 2020. One critical factor is to enhance the contribution of women to flood management in West Africa. To this end, a gender and human diversity session was held focussing on both elaborating the message[5], to analyze the current gender balance at participating institutions, and to brainstorm how the situation can be improved in the future (Figure 6). Moreover, discussions were held about potential financial support for continuation beyond 2020 in terms of a) coordination, b) operation & maintenance of the current system, c) further improvements of the system, d) enhanced capacity building, and e) definition of future roles and transfer of responsibilities.

Figure 6. Exercise to analyze gender balance at participants' institutions.

5 https://knowledge.terradue.com/pages/viewpage.action?pageId=24674773&preview=/24674773/24675476/gender%20and%20human%20diversity%20EN-FR.pdf

7. Concluding remarks and acknowledgements

The outcomes of workshop 3 will be used to further improve the FANFAR system to suit the user needs, as well as to promote its use among hydrologists and emergency managers. Specifically, the information gathered during the risk representation and communication sessions will inform post-processing of FANFAR system outputs, while the results from the technical feedback will be used to improve the IVP and Hydrology-TEP. Finally, the results from the experience surveys and presentations of the participants will give us a good impression of where we stand in terms of FANFAR system uptake and its role in flood management in West Africa.

There was a high commitment of all stakeholders to actively participate in the FANFAR system refinement process in workshop 3. For the FANFAR consortium, this is an important step towards a sustainable uptake of a flood forecast and alert system in West Africa. We wish to express our gratitude to all participants for their time, their valuable contributions and their patience and open-mindedness to go along with our methods and participate in all the different activities. We also thank our host, NIHSA, for the hospitality, and we thank the European Union for funding (Horizon 2020 / Grant Agreement 780118). We look forward to the continued discussions with participants to further improve the FANFAR flood forecast and alert system in the next workshop.