Minutes WAHARA meeting Mekelle 5-8 March 2012

Minutes

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Participants
Abdelkader Kedir (Vice President for Research and Community Service, Mekelle University)
Kifle Woldearegay (WP3 leader and study site coordinator, Mekelle University)
Hamado Sawadogo (WP2 leader and study site coordinator, INERA)
Fredu Nega (Socio-economist, Mekelle University)
Arthur Chomba (Study site manager, GART)
Douglas Moono(Coordinator, GART)
Piet Stevens (WP5 leader, ACA)
Brian Irvine (biophysical modelling WP4, Univ Leeds)
Sarah Lebel (PhD student, Univ Leeds)
Mike Kirkby (biophysical modelling WP4, Univ Leeds)
Berhane Grum (PhD student WP3, Mekelle University)
Simon Chevalking (deputy leader WP6 and WP1 Africa inventory, Meta Meta)
Aad Kessler (involved in WP3 and WP4 through PhD students, Wageningen Univ)
Derete Assefa (Agronomy and Dry land agriculture, Mekelle University)
Will Critchley (WHaTeR, Free Univ Amsterdam, member Advisory Board)
Fassil Kebede (Soil Scientist, Mekelle University)
Mohammed Abdulkadir (Hydrologist and Water Resources Engineer, Mekelle University)
Mohammed Ouessar (WP1 leader, IRA)
Abdeladhim Mohammed Arbi (PhD student WP4, IRA)
Eyasu Yazew (Land and Water Development Specialist, Mekelle University)
Luuk Fleskens (WP4 leader, socio-economic modelling, Univ Leeds)
Rudi Hessel (deputy project coordinator, Alterra)

Annexes
1. Presentations (on WAHARA website)
2. Updated Planning
3. List of agreements

Monday March 5th

Opening addresses

Welcome Dr Abdelkader Kedir (Vice President for Research and Community service of MU)
Welcomes all participants and opens the meeting. Explains that Mekelle University contributes to national thematic research and community development priorities, in international and national partnerships. WAHARA falls under this and on behalf of the university he is happy to host this meeting and open it.

Welcome & Intro Rudi Hessel
Welcomes all participants, in particular Dr. Will Critchley of the Free University of Amsterdam and coordinator of the WAHARA sister project WHaTeR, who is on the Advisory Board of the project. Rudi gives a refresher overview presentation of the WAHARA project, which will be new for some participants. Hessel's presentation is given in Annex 1, as are all other presentations.

Questions
Will Critchley: The figures shown in the presentation attribute great benefit to improved availability of domestic water. Will WAHARA focus on water harvesting for agricultural production or for domestic use? Answer: the focus is on agricultural production, but domestic water will be considered where multi-purpose WHT are studied.

Study site presentations

Mohammed Ouessar : Study site progress Tunisia.
With 1226 km2 the Tunisian study site is the smallest. It has an arid climate, counts 24,000 inhabitants, and land use includes rainfed agriculture (olive, cereals, etc) and livestock. The presentation includes an overview of water harvesting structures in Tunisia. A database is being set up for spatial and non-spatial data. The first stakeholder workshop was organized on 8 June (with DESIRE and Afromaison projects) and continued on 17 June. Climate change is an issue recognized by local stakeholders. Stakeholders suggested to combine jessour with supplementary irrigation as an innovative WHT.

Questions
Fassil Kebede: How is (surface) water in the study area conserved in arid environment after being harvested? A: Dams are only used in northern Tunisia; WHT in southern Tunisia store water underground or in cisterns.
Aad Kessler: Have techniques from North and Centre in Tunisia been tried in study site? A: Hillside reservoirs have been tried but evaporation is (too) high. Subsurface dams also used, but used for recharge of groundwater and diversion for spate irrigation. Meskat systems are similar to tabia systems. They are used on shallow soils and build up soil depth.
Piet Stevens: What type of agriculture is used? A: Olive trees are well adapted. Sometimes for subsistence, but mostly for selling olive oil. Cereals also partly for subsistence and partly for the market. Furthermore there is production of figs (fresh/dry). Irrigation is very limited. 80% of water resources are used for drinking water.
Piet Stevens: Is there potential for cropping? A: Cost-wise yes but rainfall is not reliable enough. Many people have other income sources (Libya trade).
Mike Kirkby: Intensive livestock system – is feed produced locally or imported? A: Feed is imported from the NE part of the country. Especially for use in autumn and winter.
Aad Kessler: The price of water is very low – is this correct? A: Water price is graded depending on consumption. 0-20m3/3 month 70c. Djerbais now partly supplied with desalination of seawater (last 4-5 years), alleviating the pressure on the local aquifer.The price paid is with 0.5Euro/m3 in the maximum range.
Luuk Fleskens: Is the database specific to Tunisia? A: No part of DoWWP1 for all study sites.

Hamado Sawadogo: Study site progress Burkina.
Many of the soils in the study site are considered 'Zipella'- degraded soil.Zai planting pits are used to grow millets and sorghum. Half moons, rock bunds or stone lines are other WH technologies in the study site. Meetings were held with and information exchanged with stakeholders at various levels. A recurrent request was to focus the work on the effects of climate change. Dialogue between farmers, researchers, extension services and policy makers was strongly encouraged. The project was introduced at the Provincial level in Zondoma (59 people attended).The study village Ziga also had an official kickoff meeting of the project where 153 people attended (farmers, pastoralists, women, extension, etc). Groups evaluated different WH technologies locally used. Women want to develop the production of leguminous crops using WHT (to sell).According to Sawadogo the presentation did not give an overview of all work; e.g. also worked on WP1 report. The presentation included suggestions to produce a film of WHT and to propose a field day visit as the best opportunity to diffuse technology.

Questions
Mohammed Abdulkadir: How do they fight against siltation of half moon/zai WHT technologies? A: Zai can be used for two years, the third year you have to change the location of the pits (opportunity to rehabilitate the land). Siltation is not a big problem in the two year period.

Mike Kirkby: What is the functioning of the half moon WHT? A: Perpendicular to the slope, capturing water inside. Kirkby: How big is the collecting area compared to the catchment area (CCR)? A: typically 3:1. Kirkby: What is the gradient? A: 0.5 – 1% slope. Half moons can be constructed up to 5% slope (rock bunds needed for steeper slopes).

Eyasu Yazew: Study site progress Ethiopia
The study area consists of the Suluh, Agulae, and Genfel watersheds (highland, midland and lowland areas). There is a rich WHT experience. The study area is inhibited by 49,574 household heads. Topography is flat to 40% slope. The altitude ranges from 1500-3300m asl. Annual rainfall is between 552-767mm. Land use comprises cultivated land, bushland, and forest and plantation (40-50, 20-30, 10-20%). Land degradation is a very important limiting factor. Rainfed crops include barley and chick pea, irrigated crops broccoli, tomato, and onions. Livestock is also kept. There are many indigenous and introduced WHT, especially in the last 15 years. Young people rent land and are keen on applying WHT. Contrary to elder people the young people are willing to take financial risk by borrowing money in order to implement WHT.

Questions
Piet Stevens: Who is paying for WHT? A: Free labour is provided by the community (20 days per year for integrated watershed management), and there are also food for work programmes. In the last 3 years even 40 days of free labour provision has been introduced (beneficiaries are working on improving their land).
Piet Stevens: Is livestock the 2nd livelihood? A: Agriculture leads to most income. Livestock is kept as input for agriculture and additional earnings. Stevens: Is the ratio changing due to climate change? A: Both activities are affected. Livestock is dependent on crop residues.
Mike Kirkby: Is livestock important for status? A: It used to be important 40-50 years ago. Now risk associated with livestock has diminished this trend.
Mohammed Arbi: There is a long list of WHT, what is the source of the technologies? A: Some are local, some introduced. Guidelines from MoA for design, but locally improved by farmers.
Mohammed Arbi: Did local land users accept the introduction? A: In the beginning, they needed to be convinced. The last years they are convinced and open to new interventions.

Arthur Chomba Eldred: Study site progress Zambia
The Zambia study site has changed. There is not much information on RWH in Zambia (literature review). The new study site is the Magoye catchment; there are 2 streams in the catchment with existing RWT (dams at several locations). GART has office in CDT Magoye Research Centre, and there is a meteo station. The population is concentrated in three settlement schemes (concentrated, well organised). There is a milk collection centre providing the biggest income generating activity. Farms are between 10-200ha. There are 12,705 households in the area (total population 72,591). Land use comprises dairy livestock and rainfed crop production. Cattle are also needed for ploughing. The landscape is gently undulating with slopes up to 10%. Mean annual rainfall amounts to 750 mm, with 90% falling between Nov and March, and 70 % in 3 months. During the rainy season heavy storms occur (e.g. 100 mm in 2 days), resulting in a quick response of runoff. This year there has been crop failure due to an extended dry spell. In the area there is an earth dam and a concrete dam (sugar cane and cotton commercial farmers), and also earth dams for watering livestock. Groundwater is the source of water for domestic use (boreholes 50-70m with hand pumps) and hand dug wells (<20m with bucket). NGOS and government are very active in borehole construction. A geohydrological report is available. Further WHT include local roof WH, and water collecting in roadside quarries. In-situ WH include strip/zero-tillage, planting basins and improved soil fertility, and application of live/dead mulch. Ripped furrows are implemented to deal with dry spells (water conservation in soil). A stakeholder workshop was organized on 19 Jan 2012 with 36 participants. Access to water for livestock and domestic use was identified as a main problem in long dry season,

followed by reduced crop yield. Cost of WHT is main concern. Absence of legal land tenure is a sensitive issue to stream bank and sharing communal dam.

Questions
Fassil Kebede: What is the earth dams' impact on diseases – e.g. malaria prevalence? A: Houses are sprayed. Malaria will exist despite dams (e.g. in maize crop).
Fassil Kebede: Is there a risk of using dead mulch in transmitting pathogens / crop diseases? A: Rotation maize and other crops. Douglas Moono: The main problem of mulch application is competition with feed livestock.
Eyasu Yazew: Livestock is the most important land use. What WH options are there for livestock? A: WAHARA scope is rainfed agriculture. GART will focus on water conservation. Irrigation is beyond the scope of project. Rudi Hessel: although WAHARA DoW focuses on agricultural land, there is scope to look at WHT for livestock.
Mike Kirkby: The aquifers are quite shallow. What is the geology? A: Mostly limestone but heterogeneous. Kirkby: Is the water level going down? A: Does not think so but only recent exploitation.

Workpackage presentations

Mohammed Ouessar: WP1
Presentation included progress made by study sites and MetaMeta and Acacia Water WHT overview describing WH techniques and economic aspects.

Questions
Rudi Hessel: Deliverable reports (deliverable 1.1 – 1.3)have to be ready in month 14 to send with annual report to EU (action 1).
Fassil Kebede: What is the dams' magnitude? A: For testing it depends on site budget. Rudi Hessel: Each SS has about 10,000 Euros so need to focus on field and small-scale catchments.
Aad Kessler: The size of the Burkina site is too big; can it be reduced? A: The actual site comprises part of the area presented, and the size should be 5,000km2.
Fassil Kebede: What are success stories of WH? E.g. climate change can affect success. A: WH is one of four strategies for climate change adaptation in arid and semi-arid lands.

Hamado Sawadogo: WP 2
The presentation details plans for all study sites. Under task 3 a planning workshop is proposed in each country (first half April). An inter-country workshop (with 1 researcher + 1 farmer innovator per site) is proposed for the first half of May. Where is a question. A film of WHT is to be produced by MetaMata. Select best practice from each country: e.g. based on yield, livestock, economics or vegetation. Proposes organization of a meeting to present film in study sites, with a mixed agro-pastoralist focus. The selection of WHT should be made with representation of different groups (farmers/pastoralists; women), and different levels (region; province ; district). Three WH technologies should be prioritized for experimentation. A report on the selection should give the reasons of choice; give crops which can grow; applicability requirements; and training for technologies. It is also argued to include women in training and experimentation. It is suggested to use 4 plots for experimentation. Size of plots 500m2. 20 farmers /site. (40 persons BF in two sites; 10 women).Hamado discussed the point that if selection of WHT is not ready to start experiments this year, stakeholders might lose interest; he is designing a backup experiment for Burkina Faso.

Questions:
Mike Kirkby: Does the WOCAT Technology Questionaire need adaptation? Rudi Hessel: no Gudrun Schwilch/Will Critchley think not. Will be discussed later.

Mohammed Abdulkedir: WP3
The presentation covers progress in Ethiopian site regarding all activities. Regarding the WP3planning, the deliverable is only scheduled for month 52, tasks 1-4: 19-30(52), 30-52; 26-30; 30-52.

Mike Kirkby: WP4
The presentation showed a first overview of ideas for the quick-scan tool. The basic criterion is to indicate scope for WH by the number of months that Precipitation is equal to or lower than 60% of PET. The catchment to cropped area ratio (CCR) also will be used. A WH potential map is shown for average conditions and worst 25% of years. Further overlays are shown with population density and land use maps. Work is to be expanded by inclusion of NDVI, and climate +topographic effects.

Questions
Fassil Kebede: What makes CCR different from Aridity index calculation? Volume harvested vs crop type? There is a broad coincidence of CCR + Aridity Index. Water balance for 4 months can give some further ideas.
Will Critchley: How to differentiate WH for different crops, e.g. sorghum vs maize; WHATER project would be very interested in tool. A: Could look into different relations annual precipitation/Annual crop water requirements and CCR.
Piet Stevens: Are there certain conditions where technologies can perform? A: Yes, but there is a scope difference of quick tool for Africa focus vs. more detailed study site focus. Detailed interactions required. Stevens: Are infiltration rates included? A: No; there is a data problem.
Kifle Woldeageray: This tool gives a general overview; watershed-based approach could be more appropriate (location within watershed). A: WP4 will be coming down in scale from climate to soil, topography, social.
Will Critchley: Comments on rough scale Quickscan and proposes that WOCAT can be used when focussing in.

Piet Stevens: WP5
We only briefly discussed WP5, as it only starts in month 31. To define what is expected,WP4 output delivery needs to be communicated, as well as output from other WPs. WP5 will therefore start preparing work before m 31.

Simon Chevalking: WP6
Continuous throughout project. Learning from each other already. Learning, abstracting info from other WPs. WP6 will also provide feedback to other WPs, so the arrow in the chart that displays relationships between WPs should be 2 ways. Ways to approach certain level stakeholders different in different sites.
Approaches also in the WH reviews. Films etc in other projects, also relevant WAHARA.
Proposes multi-level stakeholder meetings for dissemination policy notes.

Questions
Fassil Kebede: best practices important. Clarify. Need to have knowledge stock-pile, should be tested before dissemination. Is this done? Economic viability, environmental effect, simplicity?
A: Scalability. Cases have been tested, these work in context. Describes what relevant there.
Challenge to define indicators of learning. How do we share knowledge. Scalability: does it work elsewhere? Identify similarities , zai in Burkina Faso, similar in Zambia. How have farmers learned it.
Luuk Fleskens: during whole process – link with website
A: good question. How share? Rudi Hessel: On the website we have a restricted part that could be used for sharing drafts, and an open part that could be used for sharing final versions of documents.

Alterra will discuss with MetaMeta how they will collaborate on this (action 2).Kifle Woldemariam: We need a clear framework. Rudi Hessel: I have taken note of that (action 3).

WU (Aad Kessler)
Aad Kessler presented the PhD work that is intended.

Questions
Dereje Assefa: Often various technologies at a time are used in combination. Two is too simple, farmers need more options.
A: Why only 2 measures?
Rudi Hessel: This is in the DOW because of limited time that is available. We need to make a selection out of the many that are available. It would be possible to use combinations of measures though. We have said that 2-3 measures will be tested in each site, and that 1 of these should be innovative (from elsewhere or from us).
Kifle Woldemariam: Combis work better, e.g. stone bunds with deep trenches and trees
LuukFleskens: repeats are also needed
Mohammend Abdulkadir: Why 4-6 WHT for Tunisia and 2-3 for the other sites?
Rudi Hessel: Tunisia has more because they have more person months than the other study sites. Other sites are also welcome to do more than 2 or 3, but to us 2-3 seems realistic.

Discussion

Discussion points
1 modelling
2. range of techniques. Need list of types of WHT to come up with, 20 types (not 200)
3. Fassil Kebede: what strategy to get data. E.g. if there are no climate data. Are you sure these data will be available?

Mike Kirkby (about modelling): Basically 2 types of models. First type – quick-scan. Detail not in there.
Second type physical based, hydrological model using soil type, climate etc. Coupled with socio-economic model that will look at applicability. Not all types possible everywhere. Model will look at costs and benefits. In WP2 choice experiment is used to say something about risk.
Fassil Kebede: Will the models be available to the study site teams?
A: yes, available. Brian Irvine: We can work together with the sites initially.
Mike Kirkby: We are using global 15 km grid data for climate. Local data is better. Can use these if available. Global data about topography are also available. Soil and land use are more difficult (there are some data, but quality is not so good). Use default data, but use better if available.
Mohammed Arbi: integration model. Will there be a tool box with PESERA and DESMICE in one tool? Is the output of PESERA input for DESMICE?
Luuk Fleskens: scenarios important in WAHARA, would be good to couple. Now separate models, would be good to combine. Takes time, but might save time later (action 4).
Aad Kessler: Is the DESMICE input clear? E.g. is distance to market included?
Luuk Fleskens: The DOW gives clues about what has to be included. The work has not yet started, depends also on socio-economic conditions.
Mike Kirkby: There are 2 kinds of outputs 1: what possible at scale of whole Africa. 2: site-specific decision tree, to give range of appropriate measures. Will Critchley: second kind is WOCAT. Mike Kirkby: Yes, we will need info from WOCAT.
Mohammed Abdulkadir: spatial data also? A: perhaps
Fassil Kebede: How about property rights? We should use legal ways. Knowledge about certain types of WHT could be owned by someone

Will Critchley: Sometimes farmer innovation can be traced back to one individual. What to do in that case? Should we register this person? Can use copy-left?
Simon Chevalking: WP6 is the responsibility all partners. Will take point about copyright and copy left on (action 5)
Mohamed Ouessar: Vincent Bardin (from WU) did a literature study and categorised WHT in 5 categories. This reduces the number. Is often a matter of naming.
Rudi Hessel: We can look up some classifications for WHT, continue discussion on Wednesday or make an agreement about how we give this follow-up then. E.gWP4 to make a draft and send this around for comments (action 6).

Household questionnaire (Mohammed Arbi)
2 stages:

1> Uses biophysical information, administrative zone, farm type
2> Random sampling in each class (from step 1)

The farm household survey is only for info that we do not yet have (there is also relevant info in the study site descriptions, in the WOCAT questionnaires etc).
Need to know what WP leaders need (action 7).

Questions
Fredu Nega: socio-economic info before and after for the technologies. Represent sample. Context specific. HH quest should be context specific. Questions require rearrangement etc. E.g. occupation of each household member.
Aad Kessler: Need to discuss this, needs to be finalised. Need study site specific, for modelling need general info for all sites. Expert group to discuss it. Need perhaps 2 hours with study site (1 per site). Tomorrow during dinner.
Luuk Fleskens: It seems better to make a new version first with people formEthiopia and Tunisia, and then to circulate a new draft.
Rudi Hessel: The draft should also contain some guidelines about how the apply stratification for sampling.
A: site specific, but guidelines OK

Will Critchley: WHaTeR and WOCAT
Will gave an overview of the WHaTeR project; this project is closely related to WAHARA and we should therefore collaborate. Will is happy to be on the WAHARA advisory board but suggests that some other people are added.
In WHaTeR a more restrictive definition of water harvesting is used than in WAHARA, but this is not a problem as long as it is clear what the scope of water harvesting is in each project. In the 1970s the drought in the Sahel generated a large attention for WH, but later people forgot about it. Currently, Sudan is probably the country with the largest amount of WHT in Africa.
In WHaTeR, WOCAT is used to see how things have changed in 25 years. Will explained that WHT can be documented with the current version of the WOCAT questionnaires; he is also willing to go through the questionnaires with the participants of the WAHARA meeting. Filling WOCAT questionnaires is not quick, but a lot can be learned from it.
Will has been asked to write a book about water harvesting. WAHARA input to this book is certainly welcome (action 9).

Questions
Luuk Fleskens: For socio-economic modelling a difficulty is how to go from a single WOCAT questionnaire to a spatial model, e.g. because in the spatial model there should be a variability in for example costs of a certain measure.
A: Correct. Should be very specific about what is described. Often not known

Mike Kirkby: You showed diversion from a stream; where does the water go to?
A: It is deflected to a cultivated area, and is spread around further. There are structures that make water spread. The measure differs from the Tabia system used in Tunesia
Fassil Kebede: What is the definition of WH that you use? Are there comments on how to use WOCAT?
A: many definitions exist. E.g. in American literature WH always involves water collecting using an artificial surface (such as asphalt). Strictly speaking, In-situ water conservation is not water harvesting. However, other definitions are also used. WOCAT questionnaires contain explanation.
Rudi Hessel: The definition we are using in WAHARA is broader as we include Conservation Agriculture
A: That is possible, as long as your working definition is clear. However, be aware that Conservation Agriculture is a large field of research on its own; it is in fact much bigger than WHT.
Kifle Woldemariam: The definition is important.
A: Need to define, not judge. Make clear what is included.
Rudi Hessel: we will show the definition that is used in WAHARA on Wednesday.
Mike Kirkby: It is important to also look at measures that are intended to increase runoff from the collecting area.
Eyasu Yazew: How are WOCAT data analysed, using which software?
A: Data do not need to be analysed, don't be too sophisticated
Simon Chevalking: Is it correct that the WOCAT questionnaire is filled for 1 technology in 1 particular location?
A: Yes
Luuk Fleskens: The agri-economic survey of WP1 has questions about different WHT in the study site. WOCAT questionnaires are different
Aad Kessler: Perhaps a group of people should look at WOCAT. Is it not necessary to adapt it for WAHARA?
Rudi Hessel: WOCAT does not need to be adapted. It is used in WAHARA for at least 2 purposes: 1) in the participatory selection process 2) as input for modelling
Hamado Sawadogo: We can use WOCAT with the definition of WHT that we have in WAHARA. It can be difficult to have all the data for the questionnaires, but we need a uniform methodology for the different sites
Kifle Woldemariam: We have no experience with WOCAT. It seems to be a lot of work.
Rudi Hessel: That is why we need a pre-selection of measures to document, use 5 or 6 for example
Will Critchley: There are already 15 WHT in WOCAT from Ethiopia, look at that too.
Eyasu Yazew: We need criteria for the pre-selection
Rudi Hessel: For that information from the stakeholder workshop can be used
Luuk Fleskens: What you describe in WOCAT is a kind of average measure, many measures are variations on that but it is not necessary to described all of these
Aad Kessler: Look at WOCAT database first
Kifle Woldemariam: For example stone bund, made by communities; these have a different design depending on which community made them. There seem to be difficult points in WOCAT. We should be pragmatic. Can we use existing measures?
Luuk Fleskens: Sometimes there are no data on costs, but you can also give the info as hours that were spend
Rudi Hessel: We will discuss WOCAT in a small group with Will Critchley, Hamado Sawadogo, and Mohamed Ouessar. We will return to the subject on Wednesday.

Tuesday March 6th

During the excursion the WAHARA study site was visited. This study site includes Suluh, Genfel and Agulae watersheds. In these areas a number of water harvesting practices have been introduced, some of which gave very good results. During this field visit different water harvesting schemes such

as soil and water conservation measures, area closures, diversion weirs, check-dams, groundwater wells, small-scale dams, spring developments were visited.
Different stops were made.

Stop 1. Area closure
Area closure has resulted in improved vegetation cover as well as improved soil properties.

Stop 2. Managed watershed (Agulae)
In this watershed a number of interventions have been made including the following:

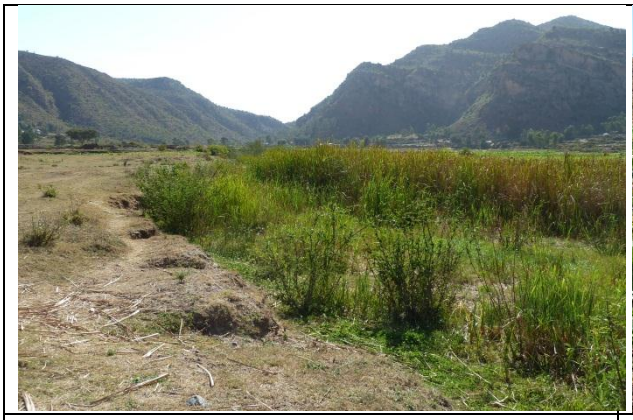
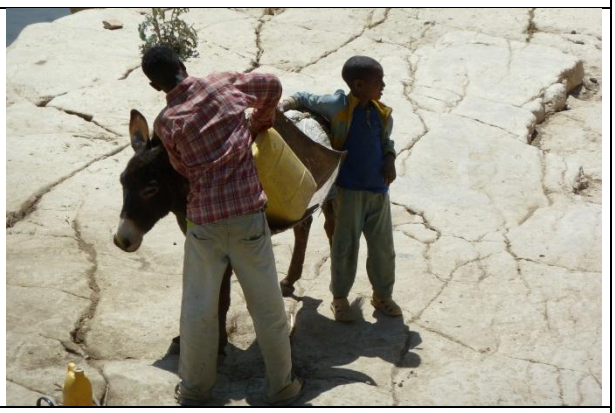
- Upstream soil and water conservation measures (including areas closures).
- Gully treatments with gabion check-dams and vegetation (like elephant grass).
- Shallow groundwater harvesting for multiple purpose.
- River diversion weirs: three diversion weirs are constructed at different points along the river.
- Irrigation using pumps (from rivers) at downstream areas.

Stop 3 Visit to Wukro area and Genfel watershed
Around Wukro town a number of natural resources management and water harvesting techniques have been introduced. Among the water harvesting technologies include micro-dams, diversion weirs, hand dug wells, motor pumps etc.

Stop 4 Visit to Abreha Weatsbeha area
Abreha Weatsbeha had been one of the most food insecure areas in Tigray. Through extensive soil and water conservation, the communities have managed to create a water buffer. Upstream soils and water conservation has recharged the groundwater systems and communities have constructed a number of alternative water harvesting technologies at downstream areas, which include the following:

(a) About 270 ponds;
(b) About 600 hand dug wells have been made from 2002-2010: with dome /circular shapes. Hand dug wells in the research area are built in gentle slopes (up to 5%), near to the watershed and most of the observed have performed as planned, in terms of storage and minimum evaporation. Farmers agreed that the excellent performance was caused by higher water recharging capacity with minimum seepage and evaporation.
(c) 63 above ground thanks which are meant for roof top rainwater collection or storage of water diverted from streams to be used for some days later. In Abreha Atsbeha aboveground tanks are circular/ spherical once made by digging a well of 3m depth, 4-6m in diameter which could store 40-113m^3 volume of water and at its base and sides are lined with cement while the upper face is open.

Result of an on-going IWMI funded research project indicate that water-harvesting practices in the research area has solved water shortage, and insured food insecurity and self insufficiency by increasing the household income. The livelihood of about 50% of households who have water harvesting structures in Abreha Atsbeha has changed due to water security. Soil and water conservation and community based watershed management has created a community resilient to droughts.

	
Rehabilitated gully at stop 2; gully had depth of up to 30 m before conservation	**Irrigated cabbage in Agulae watershed**
	
Stone walls to retain soil in Agulae watershed	**Farmer collecting water from the Agulae river**
	
Goats in Abreha Weatsbeha area, Suluh watershed	Sandy soil in Abreha Weatsbeha area, Suluh watershed

Wednesday March 7th

The WAHARA scope for WH (Luuk Fleskens)
- low-cost interventions
- intended to collect natural water resources
- buffer through storage and recharge on or below the surface
- enabling water use for multiple purposes
- can be independent units or embedded in a larger system

Multiple purposes include: drinking water for tourism (Tunisia), improvement of ecosystems or microclimates (Ethiopia).
All agree that this scope is clear.

Planning for the following months (Rudi Hessel)

Rudi Hessel gives an overview of all the work to be done till month 30, followed by detailed WP discussions. Relevant subjects such as WOCAT and PhD work are discussed during the discussion of the WP to which this subject belongs. Updated planning is given in Annex 2; partner have to work according to this planning (action 10).

WP1 (Mohamed Ouessar)

D1.1 Study site database of spatial and non-spatial data

- The structure of the database is being created right now
- What is needed are the shape-files for each SS, urgently, before March 25th(action 11).
- Luuk Fleskens: is it clear to the SS what exactly is needed? Apparently not, although the template has been circulated before
- Brian Irvine: Climate data, land use maps, soils data (texture, OM, bulk density, etc.), topography, cropping calendar, soil management, plant growth and yields, etc.
- Rudi Hessel: what is available should be sent asap, other data needed can be collected later-on (action 12)
- Luuk Fleskens: survey and WOCAT database will also reveal more of the data required
- Mapping scale of 1:50000 would be fine
- Provide whatever is available and for measures known, other info on specific WHT will be collected in WP3 for example

D1.2 Stakeholder workshop report

- Reports are missing from Zambia and Burkina, should be send before March 15th(action 13)
- Burkina will sent the report in French
- Zambia will sent full report (summary is already there)

D1.3 Report on WH inventory, history and success stories

- Based on WHT in the SS
- We need more detailed information on WHT than what has been described in the SS reports
- Date fixed for March 20th
- Burkina: make one report, there is already a full report, but must be focused on the specific SS
- Zambia: send in a report, but a section needed of detailed description of WHT in the SS
- Literature review Africa: MetaMeta and Vincent Bardin (WU) overview, but according to Kifle Woldemariam this is it not yet all-inclusive
- Kifle Woldemariam: we have and know what has been done in study sites, now we need to know what has been done elsewhere (eg Sudan)
- Simon Chevalking: there are so many databases and reports, we should not repeat the same work again
- Ethiopia: is this really representative for the African experience on WHT?
- Ethiopia: is this done according to the WAHARA definition?
- Rudi Hessel: most of the WHT described right are based on the more stricter definition of WH, but we must also be pragmatic
- Mike Kirkby: suggest to include also WHT from really arid zones, not limit to semi-arid as offered by most SS
- Will Critchley: the book to be published gives literature overview till 2009 of WHT
- Simon Chevalking: we have hundreds of excel files and others already available
- March 20th to send in additional WHT (action 14)

MS2 Household survey complete

- First include comments from Ethiopia (action 15, March 10th)
- Then send a new draft version of the Questionnaire, circulate it among the SS for a final version on March 20th(action 16)
- Survey to be completed on May 30th

MS3 WH technology compilation
D1.4 Report on assessment of the potential of WH

- Will remain as it is

WP2-WOCAT (Rudi Hessel)

- Standardized tools and methods
- Important for application are the 4-page summaries
- In Ethiopia WOCAT already has 51 practices described
- QT provides input for modeling WP4
- QA provides insight for WP5/6
- In WAHARA: define criteria for WHT, this should have been done in the first stakeholder workshop
- Make a pre-selection based on what the stakeholders consider important as WHT criteria
- After pre-selection of the WHT by the SS: complete WOCAT questionnaire
- Then: selection workshop to come to 2-3 selected WHT, 1 of which should be innovative (come from other SS or elsewhere)
- How to proceed: exclude WHT we cannot possibly test in WAHARA; select common WHT in the area and some that stakeholders would like to try (but not yet widely implemented)
- Select 4 technologies for each SS!! (action 17)
- Then document with WOCAT the QT and QA
- Will Critchley: in WHaTeR we are now documenting WHT and can make this available
- Kifle Woldemariam: be cautious with depending 100% on Stakeholder opinion, because they might not know some techniques, and only after applying they realize the effects
- The WOCAT expert group decided that the Questionnaire can be used as it is right now
- Luuk Fleskens: is it really possible to document everything in WOCAT?
- Luuk Fleskens: what happens if a technology changes, does it then become a new technology?
- Luuk Fleskens: what we saw in Ethiopia is this a WHT or an approach? According to Rudi Hessel this is an approach
- Brian Irvine: are there also maps being produced with WOCAT?
- Rudi Hessel: no, this is done in WP1
- Rudi Hessel: the QM will not be done in this project, we had many difficulties with this in DESIRE. There are easier ways to get the maps that are needed as input for PESERA.
- Kifle Woldemariam: some measures cannot be mapped as they are throughout the region
- Rudi Hessel: You can map the areas in which they are applied if you cannot map the individual measures
- Mohamed Ouessar: in Tunisia we use the land use maps for documenting regionwide measures, the more specific ones can be measured with GPS
- Mohammed Arbi: not clear which criteria for selection are more important, how do we use them? How to do it in practice.
- Rudi Hessel: there is already information about preferences of stakeholders, we cannot give a general list of criteria or a ranking of these.
- Hamado: we used 5 criteria during our stakeholder workshop (fertility, impact on livestock, etc.). We didn't need to use all criteria, only the most important criteria, this can differ in each SS
- Rudi Hessel, Hamado Sawadogo and Mohamed Ouessar will make a draft plan on how to do the selection of the technologies in the next stakeholder workshop (action 18).
- Will Critchley: in the WOCAT Q there is a section where you can add the variations on WHT
- Will Critchley: use existing documentation and informants to complete the QT and QA, and then ask the opinion of the stakeholders (SH) during the SH workshops, the latter is complementary and important

- The WOCAT right now is the baseline of what we have at this point of time; the objective of both projects is to improve these technologies or apply them elsewhere in an adapted and possibly improved version
- Kifle Woldemariam: we will first look at new technologies, if not we must look at innovations for the already existing techniques. Anyway we must leave sufficient room for improving existing WHT because this is the basis, and this can also be easier discussed with the SH
- Will Critchley suggests to discuss with Kifle how to go about this issue, which is accepted.

WP 2 planning (Rudi Hessel)

Standard format WHT

- This is skipped because we will now use WOCAT as it is

D2.1 Global compilation of WHT

MS3 WH technology compilation ready

- Pre-selection WHT should be ready by the end of this month
- Ethiopia: impossible; Zambia: can be done if based on the SH meeting
- Before the next SH workshop we also need the WOCAT Q, so we need the pre-selection urgently
- Pre-selection is only based on what is already available in the SS, for documentation purposes only
- Kifle Woldemariam: what if we now document certain WHT and then later we select others for implementation?
- Rudi Hessel: This is not very likely to occur, in the selection for implementation you offer what you know is available. In theory it is possible that SH will only select innovative WHT, but in practice this is unlikely.
- There is quite some confusion on the whole pre-selection issue: the point is to just add 4 extra WHT to the already existing database
- So each SS will select 4 extra WHT by the end of March and then fill in the WOCAT database for these. The term pre-selection is dropped because it caused confusion (action 17).

D2.1 Replicable participatory WH selection methodology

- Hamado will suggest proposal for setup of selection workshop method in French and make English version together with Mohamed Ouessar (action 18, before May)
- Rudi Hessel: what do we do with the suggestion of using video for this participatory selection, we need the support of MetaMeta for this
- Simon Chevalking: Making new videos will not be possible because of limited time; what we can do is use existing videos and/or translate them to French (subtitling) (action 19)
- Researcher workshop before June 30th: one representative of each SS, will be held in Wageningen (action 20)

MS5 WH technologies selected

- Simon Chevalking: funders could be involved in the SH workshops, start thinking now
- Luuk Fleskens: they might influence farmers' selection, this is a bit dangerous
- Kifle Woldemariam: we already have contacts with potential funders and collaboration is established. We must avoid that funders only look at their own advantage. Be cautious with whom to invite.
- Piet Stevens: be careful not to raise certain expectations by inviting donors
- We include an inventory of potential collaborators to be invited to the selection workshops; in some cases these could be invited, in others it is better only to inform them afterwards (action 21)

MS/D Design of choice experiment completed

- Luuk Fleskens: needs a consultant to help him doing this (from May-July)(action 22)
- The choice experiment allows for validation of the participatory selection process
- It sheds light on the scope for adoption in the SS of a certain WHT

- It uses certain criteria and how this affects farmers' choice (e.g. risk, C/B, etc.)
- Check in Wageningen and UK for possible experts (action 22)

MS6 Choice-experiments completed

- First decide exact sample size (500 is probably too much; action 23)
- Should all be finished before August 2013

WP3/4-PhD presentations

Berhane Grum

- Development and testing of a data collection system for WHT
- Would like to link it also to CC and impact
- Did MSc on CC impact: response of WHT to CC
- Ethiopia: why develop and test a data collection system?
- Luuk Fleskens: proposals must still be developed, so only preliminary
- Aad Kessler: more focused on Monitoring and Evaluation
- Brian Irvine: is there a budget for research? Yes, from WAHARA/WUR and MU. Rudi Hessel: depending on the exact role of the PhD students in the project it could be possible to use part of the equipment budget

Mohamed Arbi Abdeladhim

- Integrated impact assessment of WHT
- Upstream-downstream conflicts: conflicting interest and problems of governance
- Integrated management: upstream/downstream, surface/subsurface, governance levels
- Little is known about the socioeconomic impact of WHT under CC scenarios
- Objectives: 1. C/B; 2. up/downstream; 3. impacts of WHT under global drivers
- Using PESERA and further developing DESMICE
- To what extend do you look at livelihoods? Now you mainly look at cost/benefit (C/B) of a certain measure, but what about the livelihoods? Mohammed Arbi: will look at other benefits also, not only C/B of the measure.
- Kifle Woldemariam: you cannot get all C/B in a certain area, some are not measurable (knowledge, skills)

Sarah Lebel

- Assessing the sustainability of RWH systems in Africa in the face of climate change (CC)
- Sustainability for WHT measured by rates of adoption of WHT
- Calibrate BP and SE models for Burkina Faso and Zambia
- Compare the factors that influence adoption rates across Africa
- Integrated decision-making tool for WHT
- Berhane Grum: How to take into account local climate variability? A: Downscaling will be done but is difficult and brings other uncertainties
- Piet Stevens: how important is the issue of scale and how useful and applicable are conclusions?
- Luuk Fleskens: there is always a trade-off between modeling and uncertainty.

WP3 planning (Luuk Fleskens)

WP3 will make a detailed plan by July 31st(action 24).

WP4

WP4 was not discussed, as data requirements were discussed in WP1 and as model development is mainly work by Leeds. WP4 to make plan for their work (action 25)

WP6
Kifle Woldemariam: Tasks in 6.6 should be clearer defined. Need to know specific task with deadline. A: Is not meant as an extra task. But agrees (action 26)
Q: Activities for task 6? Published papers? How many working papers? A: MetaMeta will work out activities, share with everyone. Continue through email next week.
Mohamed Ouessar: There is information from the deliverables for dissemination. It does not work to leave tasks open. Rudi Hessel: Partly OK, but dissemination is also a set of mind; is something that should in the back of your head always. This cannot be captured in clearly defined tasks. Luuk Fleskens: notes are useful to have, e.g try something that does not work is good to look back a notes. Kifle Woldemariam: structure is better, when possible.

Management (Rudi Hessel)
Management structure to be communicated by e-mail by Rudi Hessel (action 27).
Skype meetings not possible – to be kept in mind when opportunities improve.
Partners to provide details on other EU Africa projects they participate in (action 28).
Update list of contact details, especially of deputy leaders when leader (SS and WP) is not able to participate/respond (action 29).
We will try to provide financial data on time to EU to avoid delays in payment from the EU (make sure they are at least not our fault).
If you have financial questions contact Alterra. Will not always have ready answers but can contact specialists or EU financial officer.
Send interim reports (received from most but not all partners) (action 30).
Presentation about reporting on EU system to be shared (action 31).
Deadline reporting to EU 60 days after term, i.e. now 60 days after 29 February 2012.
Justification of resources table each time for the reporting period only.
C-forms – please share with Alterra to check and send hardcopy when approved (action 32).
Data for annual reporting 29 March (action 33). If you brought data consult Rudi Hessel during the meeting.

Questions
Mohamed Ouessar: Is shifting budget between cost categories possible? Persons at IRA can be paid from only 1 budget. A: shifts are possible to certain extent.
Hamado Sawadogo: working on FP7 internet will perhaps be difficult. A: intention that partners do financial reporting themselves, but if really not possible inform Coordinator to define alternative way.

Feedback Advisory Board (Will Critchley)
Was present with 2 roles, namely as representative of the WHaTeR project and as member advisory Board. Finds Advisory board very useful (also based on WHaTeR experience), suggest to add more people. Gives some impressions, not really advice. See presentation in Annex 1; Alterra to consider these points (action 34). Some remarks:

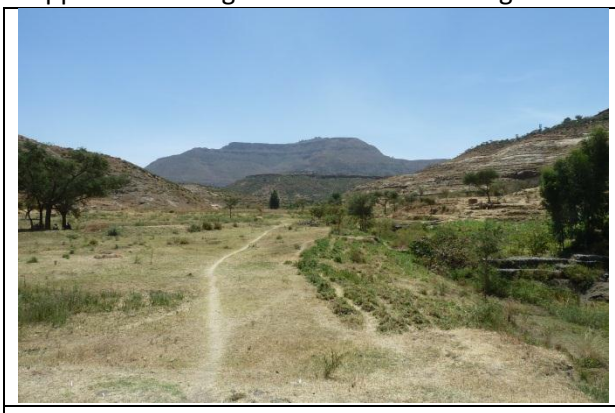
- For mutual learning between southern countries it might be possible that people go to other country in Africa. Can be very useful, even if language problem.
- CC did not come up enough, is important & WHT are very significant tools for adaptation as well as mitigation. Resonates these days. Link with CC can also help to find more money.
- Gender not evident – perhaps downplayed in WAHARA? But sure it is there – provide this info. Also for youth.
- Corporate image? Do we have that. What is distinctive about WAHARA, WHaTeR.
- Meeting has further demonstration large similarities between WAHARA and WHaTeR; it would be ridiculous not to collaborate.

- Don’t loose sight of why we do this project, CC threatens livelihoods, food production has to increase. Huge challenge, WHT one of the keys in Africa. Is deadly serious.

Other Issues
Next meeting March 2013 in Tunisia (action 35)

Closure
Rudi Hessel thanks Will Critchley for his role as Advisory Board member & for his assistance with WOCAT. He also thanks the Ethiopian team for hosting the plenary meeting and for having organized it very well.
Kifle Woldemariam: Is happy to have organised the meeting. The WAHARA project is a seed money for Mekelle University, it is really important also for Africa. Looking for further collaboration beyond project.

Thursday March 8th
On Thursday, a second excursion was held. Stops were made at 2 catchments that have been rehabilitated to a large extend. This has resulted in increased infiltration on the slopes, and a rise of the water table in the valley. Groundwater can now be extracted using wells, and can be used for supplemental irrigation as well as for irrigation during dry periods. The excursion ended in Axum.

	
Rehabilitated catchment; note gabion dam on the right	Well that provides water for supplemental irrigation

Annex 1. Presentations
All presentations given during the meeting are available on the WAHARA website

Annex 2. Adapted Planning

Note: Red text remarks & agreements

WP1

Task 1: Watershed inventory (m 1-12)
The inventory of watershed(s) selected in the study sites will include detailed characterisation of catchment hydrology, farming systems, land and water use, existing land and water management interventions and current and potential provision of environmental services. The inventory will result in an ArcGIS database and associated Access database for non-spatial data. The primary aim of the inventory is to systematically collect data for internal use within the project, including – but not limited to – use in WP4 on modelling and impact assessment of WH. The database will be **primarily** managed by study site coordinators (i.e. separate databases per site), but partial collections will be gathered for cross-site comparative analyses (WP4-6).

D1.1	**Study site database of spatial and non-spatial data**	**12**

Activities needed	**Who**	**When**	**Remarks**
Provide clarity needed maps in WPs?	WPL	20 March	Should be clear, see list made by WP1
Completed DB sent to WPL (shapefiles)	SS	25 March	Existing data
Method to share documents/maps etc between partners, e.g. ftp site	Alterra	20 March	
For missing info determine what should be done	WPL	31 March	Options: collect, use other info, etc.
Collect and provide missing info for database	SS	30 June	Will not be part of deliverable
Summary and DBs sent to PC	WPL	31 March	
Deliv sent to EU	PC	10 April	

Task 2: Stakeholder analysis and workshop on potential of WH (m 2-6)
Potential stakeholders will be identified and invited for a workshop to learn about the project and express their experiences with and views on attributes of WH technology development, identify pressures affecting their livelihoods and constraints and challenges to WH technologies. This joint learning process will also serve as training and capability building activities for the involved researchers from the partner countries. Stakeholder platforms will be established (see chapter 3).

WS1	**Stakeholder workshops on potential of WH (WP1)**	**4 (6)**
D1.2	**Stakeholder workshop report**	**6**

Activities needed	**Who**	**When**	**Remarks**
Workshop report sent to WPL	SS	15 March	Zambia (Full report instead of summary), Burkina (French)

Summary report sent to PC	WPL	25 March	
Deliv sent to EU	PC	31 March	

Task 3: Continent-wide inventory of WH technologies and approaches: Historical and success-stories analysis (m 5-12)

Several publications report on WH technologies (SIWI, 2001; NWP, 2007; WOCAT, 2007; UNEP, 2009; van Steenbergen, 2009). In order to assess the potential of WH an inventory will be made of which technologies have been adopted where and how this was achieved. In the study sites, a historical analysis of WH technologies will be made using literature, secondary data and key resource persons. Partner 3 contributes with an analysis of successful scaling of WH in selected sites across the continent. Particular attention will be paid to the role participatory approaches have played in the process. This inventory will form the main input for the compilation of technologies (WP2, Task 2).

D1.3	**Report on WH inventory, history and success stories**	**12**

Activities needed	**Who**	**When**	**Remarks**
Study site inventories	SS	20 March	More detail than Study site description
Lit review Africa (incl SS countries)	P3, SS	Done – additional information before 20 March	Sites for 'grey' literature country. More on arid zones?
Summary report sent to PC	WPL	25 March	
Deliv sent to EU	PC	31 March	

Task 4: Farm household agro-socio-economic survey (m 5-15)

The survey will characterise the resource base, livelihood strategies and current farming practices of farm households of different stakeholder groups.

MS2	**Household survey complete (WP1)**	**15**

Activities needed	**Who**	**When**	**Remarks**
Comments from Ethiopia	Ethiopia	10 March	
Survey guidelines sent to SS	WPL	13 March	Including minimum requirements
Last feedback round, try out?	SS	20 march	
Completed survey and DB	SS	30 May	
Summary and DBs sent to PC	WPL	10 June	
MS sent to EU	PC	20 June	Not sent, but mentioned in report

Task 5:Potential for WH in the study site (m 13-18)

Integrating results from task 1-4, a comprehensive overview of the potential for WH will be prepared.

MS3	**WH technology compilation ready (WP1)**	**15**
D1.4	**Report on assessment of the potential of WH**	**18**

Activities needed	Who	When	Remarks
Report structure (format)	WPL	March 31st 2012	
Draft report	SS	June 30	1 report per study site, synthesising task 1.1 – 1.4 (del 1.1-1.3)
Edits / validation	WPL/SS	July 15	
Synthesis report sent to PC	WPL	July 2012	
Deliv sent to EU	PC	Aug 2012	

WP2

Task 1: Designing a standard format for WH technology documentation (m 1-9)
The starting point for the design of a participatory WH selection methodology is to ensure sufficient information on potentially relevant technologies is available. To do this, there is a need to design and adopt a standardized single format to document technologies. Compatibility with WOCAT is desired, but a more tailored approach for WH is key.

I1	**Standard format WH documentation (WP2)**	**9**

Activities needed	Who	When	Remarks
Examine WOCAT questionnaires			Done
List of what need to know about each tech for modelling (e.g. direct/indirect, land sacrificed, storage capacity) and analysis	WP4&others	July 31st 2011	See WP1 task 3
Adapt WOCAT questionnaire		Dec 31st	Was not needed
Guidelines		Aug 31st	See WP1 task 3

Task 2:Compilation of innovative WH technologies (m 8-16)
Local study site technologies will be prepared by respective partners; global examples will be added by consortium partners and by inviting third parties (e.g. SMEs, NGOs, relevant projects) to contribute. A major input to the compilation will be the continent-wide inventory of WH technologies made in WP1 (Task 3). Quality checks will be performed and a high profile compilation disseminated.

D2.1	**Global compilation of WH technologies**	**16**
MS3	**WH technology compilation ready**	**15**

Activities needed	Who	When	Remarks
Select 4 WHT per site for WOCAT documentation	SS	March 31	
Fill study site info in WOCAT	SS	June 30th 2012	To be used in selection workshops
Fill innovative WH in WOCAT (global)	All	June 30th2012	To be used in selection workshops
Dissemination products	WP2 with WP6	Aug 31st 2012	

Task 3: Design of a replicable participatory selection methodology (m 10-16)
A two-stage selection methodology will be designed, consisting of an inter-site researcher workshop and a local stakeholder workshop. The first stage will maximise cross-pollination between sites, and help researchers to gain a thorough understanding of each others' sites technologies (and also of the third party contributed technologies) compiled in Task 2, and acts as a safety valve should stakeholders in the second stage only select locally known WH technologies. The inter-site researcher workshop serves as an activity of training and capacity building for researchers from the African partner countries. The methodology designed will be used in all study sites to assist stakeholders in selecting the most promising WH technology for their purposes and conditions (characterised in WP1). Use will be made of the quick-scan tool to be developed in WP4.

D2.2	**Replicable participatory WH selection methodology**	**16**
WS3	**Inter-site researcher workshop on participatory selection WH (WP2)**	**16**

Activities needed	**Who**	**When**	**Remarks**
Design methodology for selection, which criteria to use for selection	WP2, coord, Ouessar	April 30 2012	With people who have WOCAT experience & DESIRE?
Comments partners on methodology	All	May 15	
Video to show at selection workshop	MeteMeta	May 31	MetaMeta videos. New videos not possible
Short-list of technologies to choose from, based on WOCAT & other info from WP1,2 of WAHARA (e.g. video)		May 31st	Before research workshop, using a.o. quick-scan. Cannot implement all possible techs.
Researcher workshop	SS, WP2, coord, Wageningen	Jun 30th 2012	Exchange WOCAT info, select innovative technologies that could be suitable, dry-run to finetune methodology

Task 4: Selection workshops (m 16-18)
Implementation of the selection workshops and identification of WH technologies for testing (in WP3) in each site using the methodology developed under Task 3. Two levels of workshops will be organized: an inter-site researcher workshop to test and refine the methodology, and a local stakeholder workshop – one in each of the four sites. At least two, and preferably 3, WH technologies should be selected for subsequent testing in each study site, one of which must be new to the area; this can be the technology selected by researchers if local stakeholders have not chosen to try a new innovative technology. In the Tunisian study site at least 4 and preferably 6 WH technologies will be selected for implementation.

WS4	**Local stakeholder workshops on participatory selection WH (WP2)**	**17**
MS5	**WH technologies selected**	**17**
2.3	**Selection workshop report**	**18**

Activities needed	Who	When	Remarks
Workshop preparation (also logistics)	SS	Jul 31st 2012	
Workshop	SS	Aug 31st 2012	
Follow up? Development action? Can we involve potential funders for this? Additional support?	All	2nd half project	WP6 to provide some follow-up. Start thinking about it now. Is important to consider which potential funders.
Inventory of potential support	SS	Jun 30	
Consider Payment for implementation?	SS	Jul 31st, 2012	

Task 5: Design of a choice-experiment (m 13-17)

The participatory selection process will result in a selection prone to biases inherent to the process (innovators are actively recruited and likely overrepresented, stakeholder representation may be uneven, and the selection process may itself have a dynamic of its own influencing outcome). It is moreover a qualitative method which cannot be used to extrapolate findings to a larger population. The latter is important to understand the potential for adoption of technologies. Therefore, a choice-experiment will be designed for individual stakeholders to analyse stakeholder preferences based on attributes of WH technologies and decision-making. This choice-experiment will allow validation of the participatory selection process and assessment of the potential for WH technology adoption in the study site.

	Design of choice experiment completed (not defined as MS, I or del)	**18**
	Contributes to 2.4 (task 6)	**30**

Activities needed	Who	When	Remarks
Hire someone for choice experiment	Leeds	May 1 2012	
Design choice experiments	Leeds	July 31	
Comments on design	SS, All	Aug 15	
Final design	Leeds	Aug 31 2012	

Task 6: Implementation and analysis of choice-experiment (m 18-30)

Task 6: Implementation and analysis of choice-experiment. Implementation of the choice-experiment in each study site with a target sample size of 500 potential implementers of WH technologies. The choice-experiment will result in a rich dataset requiring a substantial analysis effort. Next to validating the participatory selection process, results will be used to characterise stakeholder decision-making in the economic model of WP4.

2.4	**Report on stakeholder choice validation**	**30**
MS6	**Choice-experiments completed**	**22**

Activities needed	Who	When	Remarks
Determine exact sample size	Leeds	Sept 30	Part of task 5
Selection of which stakeholders	Leeds	Sept 30	Part of task 5
Implementation	SS	Dec 31 2012	

Analysis	Leeds	Aug 2013	

WP3

WP3 will make a detailed plan by July 31 (action 24)

Task 1: Facilitation and documentation of the adaptation design process of selected WH technologies (m 19-24)
There is very little information available about the steps beneficiaries have to go through in order to design WH technologies, especially if they are not locally developed. Local stakeholders will take the lead and site project staff will assist beneficiaries in the process of adapting the WH technologies selected in WP2 to local circumstances. This task will document the process using interactive means such as film, recorded interviews, maps, sketches, etc.

	Contributes to I4 (Task 2)	**26**

Activities needed	**Who**	**When**	**Remarks**
Format for documentation and facilitation, should facilitate stakeholders in adaptation	WP3, PhD students	Sept 30 2012	Social dimension needs follow up
Comments on draft	SS, All	Oct 15	
Show original selected WHT to stakeholders			
Which number of farmers to do this?			1 for each replicate?
Documentation products (for award)	SS		

Task 2: Award competition for the best documentation of design and adaptation process (m 24-26)
Organize a competition for the award, including a suitable prize for the winners. To create an incentive to partners to put good effort in process documentation, as well as for collaborating closely with local stakeholders, an award competition will be designed. The award should stimulate engagement of researchers and land users alike. Preliminary ideas include enable a study site delegation to present their documentation materials at a relevant high-profile international conference, to visit another study site to present and discuss their findings, or act as host to showcase their pilot project.

I4	**Documentation design/adaptation process**	**26**

Activities needed	**Who**	**When**	**Remarks**
Decide on award			
Selection criteria			

Task 3: Develop participatory monitoring protocols for WH technology performance monitoring (m 19-24)
The technology performance monitoring will comprise a sound field experiment including variations in biophysical conditions and/or variations in use of agricultural inputs. Attention will also be paid to environmental services other than biomass production, and where appropriate, take into account downstream effects. Data collection to perform financial and economic cost-benefit analyses will

form an important part of the protocol. Monitoring protocols will also specify scale, frequency and duration of monitoring.

I3	**Protocols for performance monitoring**	**24**
MS7	**Protocols performance monitoring**	**23**

Activities needed	**Who**	**When**	**Remarks**

Task 4: Participatory monitoring and evaluation (m 25-52)
Monitoring campaign lasting two or three years (depending on study site and WH technology characteristics–duration will be made clear at milestone M7). Regular stakeholder meetings on planning and M&E. The focus will be on synergies with and impact on existing farming systems and ecosystem services. The evaluation of technologies will take into account the environmental, social and economic sustainability of technologies at field, farm, village, and – where possible without resorting to modelling (WP4) – catchment level. Emphasis will be given to the level at which the WH technology is managed and the level at which the technology may have an impact. If a scaling experiment can be applied, the level at which each technology is managed individually is important as well as the level at which the combined technologies may have an impact. Finer scales may in some cases be appropriate, larger scales typically not.

MS8	**WH technologies adapted and implemented**	**24**
3.1	**Final report adaptation and performance**	**52**

Activities needed	**Who**	**When**	**Remarks**
Continuation of adaptation and documentation			From implementation
			Timing depends on season too

WP4

Not discussed; data requirements covered in WP1. Quick-scan tool discussed on Monday. Model development (PESERA, DESMICE) will be done by Leeds. UNIVLEEDS to provide further breakdown of tasks (action 25).

Task 1: Continental-scale quick-scan tool development (m 9-16)
Based on outputs from WP1 and rudimentary modelling, a quick-scan tool will be developed to aid selection of WH technologies for sites in WP2. The tool will after evaluation and upgrade be turned into a project deliverable. The quick-scan tool should be able to indicate whether a certain technology would be feasible for a certain site considering basic agro-ecological and socio-economic characteristics. It will give an indication of critical factors for implementing the technology. The tool is intended to be usable by study site research teams, but its outputs are to be easily understood by

local stakeholders (at facilitated technology selection workshops). The tool will use input data which are available for the whole of Africa, so that next to use in study sites it can help to extrapolate project findings for the potential of WH in Africa (WP5, Task 2).

I2	**Quick-scan tool concept outline (WP4)**	**10**
MS4	**Quick-scan tool working version (WP4)**	**15**
D4.1	**Continental scale quick assessment tool**	**16**

Activities needed	**Who**	**When**	**Remarks**
List of what needed in tool	WP2	Dec 31st	
Conditions for WH technologies (applicability limits), scale, amount of storage, type of storage. What need to have for WHT to be effective?	SS, All	Dec 31st	
Tool	WP4	Jul 31st 2012	

Task 2: Hydrological model development (m16-40).
WH will be integrated in the biophysical PESERA model by radical adaptations including the routing of runoff from runoff collection through storage to receiving/crop growing areas.

	Contributes to 4.2 (Task 4)	**40**

Activities needed	**Who**	**When**	**Remarks**

Task 3: Economic model development (m 16-40).
The economic DESMICE model will be developed further to ensure compatibility with WH technologies and systems. Collective decision-making and the possibility to analyse conflicting stakeholder interests will be incorporated. The model will have two modes of operation: an optimization mode for implementing WH from scratch, and an incremental mode taking into account existing WH technologies.

	Contributes to 4.2 (Task 4)	**40**

Activities needed	**Who**	**When**	**Remarks**

Task 4: Model integration (m 25-40).
PESERA and DESMICE will be closely linked. Because of this, iteration and optimization routines of PESERA and DESMICE will be coupled to allow simultaneous optimization of both. When finalized the model can be used to assess upstream/downstream interactions at watershed scale.

4.2	**Integrated model WH impact assessment**	**40**

MS11	PESERA and DESMICE models integrated	36

Activities needed	Who	When	Remarks

Task 5 not discussed as after m 30

WP6

Task 1: Inventory of farmers' experiences (m 10-30).
The farm household agro-socio-economic survey (WP1, Task 3) will contain questions on farmers' sources of knowledge and experiences with knowledge transfer regarding WH technologies they apply. Additional data from the workshops of WP1 and WP2 will also be considered in this inventory of farmers' experiences of knowledge transfer. Suitable indicators of knowledge diffusion and stakeholder learning and action will be identified and used throughout the tasks of this WP.

	Contributes to I5 and MS9 (task 2)	30

Activities needed	Who	When	Remarks
Identify relevant questions (review of ASE survey)	WP6	March 10 2012	Relevant to sources of knowledge
Identify additional data sources related to WP1 and WP2	WP6 lead, ALL SS	August 31 2012	From Stakeholder workshops and others

Task 2: Inventory of Government and NGO approaches (m 19-30)
Approaches to knowledge transfer will be studied by key informant interviews and secondary data collection. This will be done for ongoing or recently finished interventions in the study sites, and in conjunction with Task 4 of WP1 for selected areas where successful scaling of WH technologies has taken place.

I5	Report on approaches and experiences of knowledge transfer of technology	30
MS9	Knowledge transfer indicators defined	24

Activities needed	Who	When	Remarks
Identify indicators of knowledge diffusion, stakeholder learning and action	WP 6 to compile, review SS	Feb 28 2013	From data review

Task 3: Design and establishment of a continuous review process of field experiments (m 22-57).
Intended to run simultaneous to the field experiments of WP3, a review process will be designed to involve multi-level stakeholders in keeping track of the key results and messages that the participatory research produces. A specific aim of the review process is to generate ideas on how to disseminate emerging knowledge within the project and to stakeholders. The approach adopted will

be checked for its effectiveness using the indicators of knowledge diffusion and stakeholder learning and action from Task 1. This task serves primarily as a learning process to test strategies for knowledge transfer and enabling of stakeholder learning and action before propagating them widely in Task 5.

6.1	**Contributes to: Report on options and enabling conditions to achieve spreading of WH**	**57**

Activities needed	**Who**	**When**	**Remarks**
identify indicators of knowledge diffusion, stakeholder learning and action	WP6 leader (iteration by all SS)	Dec 2012 – Feb 2013	
Review of participatory research, multi-level (simultaneously with field experiment, 'test environment' for strategies)	WP6	Dec 2012 – October 2015	

Task 4,5: not discussed as after m 30

Task 6: Dissemination to stakeholders at all levels (m 10-60)
All key messages and results that the project will generate and will be disseminated to appropriate stakeholders, from local land users to international organizations. Policy notes will also be written, and will be addressed to local, regional and national authorities and regulatory bodies in the partner countries, and the international policy arena (African Union, the Economic Commission of Africa, and the African Development Bank, EU, UN, FAO, IFAD and other organizations mentioned in section 3.1).

6.3	**Policy notes**	**60**
6.4	**Suite of dissemination products**	**60**
MS17	**Project dissemination products ready**	**59**

Activities needed	**Who**	**When**	**Remarks**
Share audiovisuals (and minutes) of stakeholder activities in SS	SS	continuous	
at field level periodic photographs at same places	SS	continuous	when: before start (picture of dry and wet season, then continuing wet /dry season)
Identify dissemination product with all project partners (taped lectures, flashcards, short videos, school material, etc)	WP6, WP7	continuous	
Feed material to WAHARA website and other websites	WP6, WP7	update of WAHARA site every six months	
Set up, maintain and disseminate series of flashcards with main WH techniques – keeping track of distribution and usage	WP6	continuous	
Place visual material on WH in Africa on	WP6	continuous	One special alert every

www.thewaterchannel.tv and announce through alerts and highlights			six months
Prepare series of taped lectures from different WAHARA countries and other countries that can be used in education	WP6, All SS	continuous	Three lectures ready annually – thus building up a package
Prepare dissemination products in partnership and co-production with other incorporating findings from WAHARA	WP6, All SS	continuous	At least three popular publications with wide dissemination For 2012-2013 poplar book on costs and benefits in water harvesting and water buffer management, resilience and agricultural productivity

Annex 3 List of Agreements

No	What	Who	When	Remarks
1	Complete deliverables 1.1-1.3	WP1 with SS	April 15th	
2	Arrange collaboration website	Alterra, MetaMeta	April 30th	
3	Provide framework (method) for sharing documents	Alterra	March 20th	
4	Consider coupling PESERA, DESMICE	WP4	May 31st	
5	Copyright issues, copy-left	WP6, 7	May 31st	
6	Draft list of technologies (categories) to include in quick-scan tool	WP4	April 1st	
7	Inform WP1 which data should be collected through household inventory	WPs	March 20th	
8	Guidelines for stratification sampling household survey	WP1	March 31st	
9	WAHARA contribution to book Will Critchley	SS	April 15th?	Alterra to check with Will Critchley
10	Work according to updated project planning	All	From now	Some (NOT ALL) actions from planning are also included in this action list
11	Shapefiles to WP1	SS	March 25th	
12	Send available maps to WP1 asap	SS	March 25th	
13	Workshop reports to WP1	Zambia, Burkina	March 15th	
14	Any additions to WH inventory	All	March 20th	
15	Include comments Ethiopia in household survey	WP1	March 10th	

16	Draft of household survey questionnaire	WP1	March 20th	
17	Select 4 WHT for documentation with WOCAT	SS	March 31st	
18	Draft plan for organising selection workshops stakeholders	Alterra, WP2, Ouessar	April 30th	
19	MetaMeta videos available to WP2 for workshops	WP6	May 31st	
20	Researcher workshop in Wageningen	Alterra, WP2, SS	June 30th	
21	Inventory of potential collaborators	SS	May 31st	Including whether or not invite to SH workshops
22	Hire someone for choice experiments	WP4	May 31st	
23	Decide on sample size choice experiments	WP4	July 31st	
24	Detailed work plan WP3	WP3	July 31st	
25	Work plan WP4	WP4	July 31st	
26	Guidance (concrete) on task 6.6	WP6	May 31st	
27	Arrange management structure (who on which board)	Alterra	April 15th	
28	Info on involvement with FP7 Africa call projects	All	April 30th	
29	Updated contact details	All	April 1st	
30	Send interim reports to coordinator	All	Every 6 months	
31	Share presentation about reporting	Alterra	March 20th	On WAHARA website too
32	Send draft C-form to Alterra for check	All	March 20th	
33	Provide all info for reporting period 1	All	March 29th	
34	Consider comments by Advisory Board	Alterra	April 30th	
35	Organise 3rd plenary meeting	IRA	March 2013	