FOCUS-Africa

Research and Innovation Action (RIA)

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Report on theintroductory session onresponsible researchand innovation

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Summary

This report provides a brief overview on the concept of Responsible Research & Innovation (RRI), the methodology used to put the theory into practice, the outputs from the workshop sessions and RRI action lists prepared by the FOCUS Africa Case Study (CS) teams, as well as a set of recommendations to foster the uptake of RRI within the project.

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FOCUS-AFRICA

Full-value chain Optimised Climate User-centric Services for Southern Africa

D1.8 - Report on the introductory session on Responsible Research and Innovation

Lead Beneficiary: LGI Sustainable Innovation

August 2021

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About FOCUS-Africa

FOCUS-Africa – Full-value chain Optimised Climate User-centric Services for Southern Africa – is developing sustainable tailored climate services in the Southern African Development Community (SADC) region for four sectors: agriculture and food security, water, energy and infrastructure.

It will pilot eight case studies in five countries involving a wide range of end-uses to illustrate how the application of new climate forecasts, projections, resources from Copernicus, GFCS and other relevant products can maximise socio-economic benefits in the Southern Africa region and potentially in the whole of Africa.

Led by WMO, it gathers 14 partners across Africa and Europe jointly committed to addressing the recurring sustainability and exploitation challenge of climate services in Africa over a period of 48 months.

For more information visit: www.focus-africaproject.eu

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Executive Summary

This report provides a brief overview on the concept of **Responsible Research & Innovation (RRI),** the methodology used to put the theory into practice, the outputs from the workshop sessions and RRI action lists prepared by the FOCUS Africa Case Study (CS) teams, as well as a set of recommendations to foster the uptake of RRI within the project.

During the first FOCUS Africa stakeholders' workshop, a **RRI workshop** session was facilitated to provide a **hands-on learning of the RRI concepts, as well as to initiate a first list of RRI actions**. The workshop was structured around the five steps of the FoTRRIS '5-course meal' methodology designed to guide on how to co-create RRI projects. The concepts presented were applied through three parallel online breakout sessions, each focused on the case study themes: Agriculture & Food Security (CS1, CS2, CS3 & CS4); Water & Infrastructure (CS5 & CS8); and Energy (CS6 & CS7). Partners were invited to 1) define the objectives of their case studies, 2) map the main stakeholders and consider the dynamics at play within their case study sector system, 3) envision what the future of their case studies would look like if the goals were attained, 4) identify the actions and steps required to reach their objectives, reflect upon how success would be evaluated, and finally 5) share perspectives with others.

The **eight RRI key issues**, namely ***stakeholder inclusion, ethics, gender equality, governance, open access, public engagement, science education,*** and ***impact*** served as a framework to discuss and identify RRI actions for CS teams. Each of these issues were considered through the lens of the project Work Packages (WP), existing tasks and activities, and led to a set of RRI actions identified by the CS teams (Figure 1). Based on this as well as an analysis of WPs through the perspective of the **six FOCUS Africa impact categories**, a set of **recommendations** for the uptake of RRI principles within the project were proposed.

Figure 1: FOCUS Africa and RRI overview

Keywords

Responsible Research and Innovation, Climate services, workshop, Stakeholder inclusion, Impact, EU-Africa collaboration

Acronyms

CS	Case Study and/or Climate Service
CSO	Civil Society Organisations
EC	European Commission
EU	European Union
FAO	Food and Agriculture Organisation
FOCUS-Africa	Full-value chain Optimised Climate User-centric Services for Southern Africa
FGD	Focus Group Discussion
GFCS	Global Framework for Climate Services
GMO	Genetically Modified Organism
IPCC	Intergovernmental Panel on Climate Change
MISC	Mapping Innovations on the Sustainability Curve
NGO	Non-Governmental Organisation
RRI	Responsible Research & Innovation
SADC	Southern African Development Community
SDG	Sustainable Development Goal
SSSA	Sant'Anna School of Advanced Studies
TANESCO	Tanzania Electric Supply Company Limited
WFP	World Food Program
WMO	World Meteorological Organisation
WP	Work Package

1 Concept Introduction

Responsible Research and Innovation (RRI) is a term used by policy-makers and academics to refer to research and innovation that is **ethically acceptable and socially desirable** (Gurzawska, Mäkinen, & Brey, 2017). The grand societal challenges that lie before us, such as climate change, ageing population, food, water, materials and energy safety, public health, and security will have a better chance of being tackled if all societal actors are engaged in the co-construction of innovative solutions, products and services (European Commission, 2014). This is where RRI comes into play: to respond more effectively and urgently to these challenges by bringing Science & Society together (Timmermans, 2013). Although the concept is gaining more traction nowadays, the concept emerged more than a decade ago in the academic sphere with the seminal works of Grunwald, Owen and Von Schomberg (Grunwald, 2011) (Owen, 2013) (Von Schomberg, 2013). In particular, the rise of nanotechnology came with the awareness of its potentially adverse effects, calling for 'Responsibility' in scientific-technological advancements (Simakova, 2013). The rise of RRI in academic discourse was echoed by developments in policy and governance of R&I at European Union (EU) and European Commission (EC) levels. In 2013, the Expert Group on RRI commissioned by the EC published a report on the State-of-the-Art in Europe on RRI with policy recommendations to strengthen RRI, which include the following definition of RRI.

RRI was gradually introduced in the fifth, sixth and seventh Framework Programmes (FP5, 6 and 7),

> RRI refers to the **comprehensive approach** of proceeding in research and innovation in ways that allow **all stakeholders** that are involved in the processes of research and innovation at an **early stage** a) to obtain relevant knowledge on the **consequences of the outcomes** of their actions and on the range of options open to them, b) to effectively **evaluate** both outcomes and options in terms of **societal needs and moral values**, c) to use these considerations as functional requirements for **design and development** of new research, products and services. Therefore, RRI approach has to be a key part of the research and innovation process and should be established as **a collective, inclusive and system-wide approach** (Jacob, et al., 2013).

as well as in the Horizon 2020 Programme (European Commission, 2020). This saw the emergence of structuring projects on RRI, funded by the EC, including **FoTRRIS** & **RRI tools**, which material the RRI workshop methodology drew upon.

FoTRRIS

The main objective of **FoTRRIS** was to develop and introduce new governance practices to foster RRI policies and methods in research and innovation systems, as well as implement the new governance practices in five different Member States. To stress that RRI is collaborative activity from the very beginning and throughout a project lifetime, FoTRRIS adds the prefix 'co' to the acronym co-RRI. FoTRRIS performed five transition experiments, i.e. experiments to support the transformation of present-day research and innovation strategies into co-designed RRI-strategies. Based on the experiments, FoTRRIS provided guidelines on how to set up a competence cell that encourages various knowledge actors from science, policy, industry and civil society to co-design, -perform, and –monitor co-RRI-projects that are attuned to local manifestations of global sustainability challenges, as well as on how to co-create RRI projects through the FoTRRIS cookbook (http://fotrris-h2020.eu).

The aim of the RRI tools project was to develop and use a Training and Dissemination Toolkit on RRI, to be addressed and collaboratively designed by all the stakeholders of the Research and Innovation (RI) chain of value, including Researchers, Civil Society, Industry and Education but will specially focus on Policy Makers in order to impact significantly in the future governance of RI. The project envisaged the creation of 19 RRI Hubs covering 30 countries of the European Research Area for the development of the toolkit and a Community of Practice in RRI which will assure the use, evolution and enrichment of the toolkit. The RRI Toolkit led to an innovative and creative set of tools comprising practical digital resources and actions aimed at raising awareness, training, disseminating and implementing RRI. The RRI Hubs are responsible for training on the use of the toolkit throughout Europe, of advocating policy makers at a national and regional level and of disseminating the concept of RRI to a wide audience (https://rri-tools.eu/).

Stakeholder engagement: the key guiding principle of RRI

RRI represents a more society-centred approach to Research and Innovation. It aims to develop innovations that are closer to real societal challenges, offering solutions to global systemic problems. As the global challenges manifest themselves in different ways on a local scale, solutions should also be developed at a local level – **'glocal'** challenge (FotRRIS, 2018).

Within the R&I system there have been multiple examples of controversies and failures in fulfilling societal expectations: Genetically Modified Organism (GMO), fracking, food safety etc., in part because not all key actors were engaged (RRI Tools, 2016).

RRI is about combining the intelligence of four types of stakeholders (civil society, entrepreneurs, policymakers, researchers – also called the '**quadruple helix'**), with a multidisciplinary approach in the innovations (socio, eco, technical, legal, etc.) and involving citizens and stakeholders as equally important actors from the very start of the research and innovation project (Figure 2).

Figure 2: The stakeholder type 'quadruple helix'

How does this apply to FOCUS Africa?

Appropriate stakeholder engagement and inclusion represents a fundamental principle of RRI and is key to the success of the project and the development of its future Climate Services (CS). The Global Framework for Climate Services (GFCS), initiatives such as WISER or the WMO-led Climandes and Sustainable CIS projects, all highlight the importance of effective engagement between the developers and users of any CS. For instance, Climandes emphasised on using CS for

capacity building among the local community of smallholder farmers in Southern Peru (MeteoSwiss & Senamhi, 2018). The WISER project had many similar takeaways regarding the importance of working closely with stakeholders to maximise impact and ensure the viability of a CS. The WISER project also placed a clear emphasis on the importance of working closely with local stakeholders and securing their buy-in to the co-development and co-delivery process in order to maximise the impact of the CS (Carter, 2019). In April 2021, a WISER learning event was organised and presented recommendations resulting from the three days of virtual engagement between WISER projects. These lessons are included in Annex 1 for reference, together with a brief analysis of the potential links with RRI and FOCUS Africa.

Among many others, Hewitt et al. stress the necessity to bring the needs of the users into the design of the CS as early as possible and throughout the development cycle (Hewitt, 2020). The quality of the exchanges, relationships and networks are also highlighted by Weichselgartner & Arheimer, who promote the creation of polycentric, multi-partite processes in a sustainable dialogue built on non-hierarchical knowledge-action systems (Weichselgartner, 2019). Regarding the relationship between CS providers and users, the term ***'fellow-user'*** emerged, during the first external stakeholders' workshop organised by FOCUS Africa, as a better alternative to the term ***'end-user'*** from Professor Coleen Vogel's presentation. It was advised that the usage of 'fellow-user' would be considered a more collaborative way of looking at the relationship with the CS users, and was therefore adopted by the FOCUS Africa team.

RRI process dimensions and key issues

The RRI Toolkit Community of Practice came up with four process dimensions which RRI relies upon, namely **Diversity & Inclusion; Anticipation & Reflection; Openness & Transparency** and **Responsiveness & Adaptive Change** (RRI Tools, 2016).

Diversity & Inclusion means that actors need to be involved and listened to in the early stages of R&I. Early involvement of a wide range of actors and publics in R&I practice, deliberation, and decision-making is expected to yield more useful and higher quality knowledge. This strengthens democracy and broadens sources of expertise, disciplines and perspectives.

Anticipation & Reflection points to the idea that R&I should care about how its own dynamic will affect the future. This refers to the need to envision impacts and reflect on the underlying assumptions, values, and purposes to better understand how R&I shapes the future. This produces valuable insights and increases our capacity to act on what we know.

Openness & Transparency means that R&I should be open to society in a meaningful and honest way. This implies communicating in a balanced and meaningful way methods, results, conclusions, and implications in order to enable public scrutiny and dialogue. This benefits the visibility and understanding of R&I.

Responsiveness & Adaptive Change refers to the R&I needs for its values and processes to adapt to emerging knowledge and needs. This means that R&I should be able to modify modes of thought and behaviour, overarching organisational structures, in response to

changing circumstances, knowledge, and perspectives. This aligns action with the needs expressed by stakeholders and publics.

These guiding principles help frame RRI from a conceptual perspective and identify changes needed throughout R&I systems, to provide a lens through which to consider certain key issues or policy agendas. Based on previous RRI works and research (European Commission, 2020) (RRI Tools, 2016), eight key issues, namely ***stakeholder inclusion, ethics, gender equality, governance, open access, public engagement, science education,*** and ***impact***, were identified and used to frame the RRI discussions (Figure 3).

Figure 3: RRI framing issues

How does this apply to FOCUS Africa?

The key issues serve as a framework to identify RRI actions for CS teams. They were first considered to brainstorm RRI ideas during the workshop sessions, and for building the RRI action lists afterwards.

In the context of FOCUS Africa, each of these issues are considered through the lens of the project Work Packages (WP), existing tasks and activities. Given that the essential of the efforts are centred around the development of climate services and maximising the impact of the project outputs, the eight issues were envisaged through this lens.

2 Methodology

2.1 Task overview

Nested in the first WP focused on Stakeholder Engagement, the main objective of **Task 1.5** was to introduce the consortium members to RRI principles and identify actions to adopt throughout the project.

As part of the first stakeholders' workshop, LGI organised a session to introduce the concepts and tools of RRI. To do so, LGI built on the concept for RRI introduced in the framework of a previous H2020 project: FoTRRIS. This concept includes a co-creative dimension of the relationship between Science and Society 'co-RRI', which is in line with the approach planned in FOCUS-Africa. The project partners and the external stakeholders who attended the workshop were introduced to this concept and the tools related to it. After the workshop, a survey was sent to the project partners to collect a list of tasks and actions in which they plan to adopt the RRI approach throughout the project. Together with the outcomes from the workshops, the results of the survey are collated in this present deliverable ***D1.8 - Report on the introductory session on Responsible Research and Innovation*** (M12, Public). This report also includes a list of recommendations of RRI actions in line with the FOCUS Africa WPs and six impact categories. The ambition is for the identified or recommended RRI actions to be tracked along the project, with progress reviews during consortium meetings, and integrated within the internal monitoring and evaluation of the project.

T1.5 followed four main steps as illustrated in Figure 4.

- **From concept into practice**: A literature review of the theoretical concepts and tools was conducted in order to design a workshop for the FOCUS Africa partners and stakeholders to introduce the conceptual framework and apply it in practice.
- **Workshop**: During the second day of the first FOCUS Africa stakeholders' workshop, an introduction to the concepts of RRI was given, followed by interactive workshop sessions held online and in parallel by case study themes, as described in more detail in sections 2.2 and 3.
- **RRI actions**: A first set of actions were identified as a result of the workshop sessions, which were completed by follow-up 'surveys' in the form of digital 'murals' in order to collaboratively share ideas and give the opportunity to monitor the proposed actions in the long-term (sections 2.3 and 4). A guide on how to complete the mural matrices was prepared and shared with the consortium (Annex 2).
- **Recommendations**: The workshop steps, outcomes and proposed actions were summarised and analysed in the present report, and a set of recommendations for RRI actions were proposed based on the key issues, WPs and impact categories (section 5).

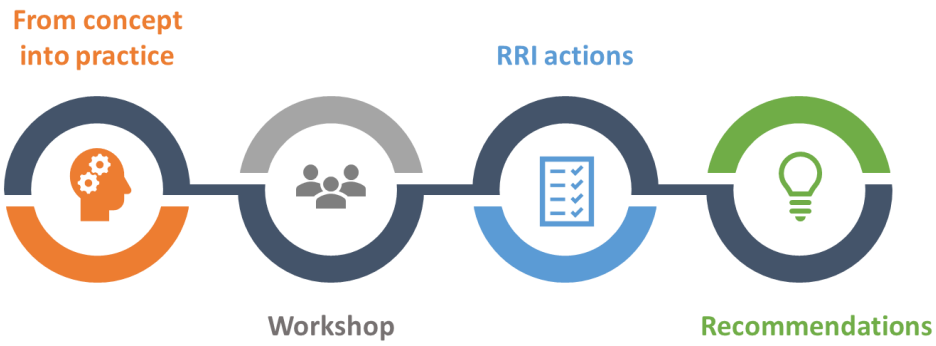

Figure 4: Task T1.5 overview

2.2 Workshop approach

The first stakeholders' workshop went over three days: two internal and one external, with a focus on RRI on the second day. Day 2 started with an introductory presentation on RRI followed by workshops in breakout sessions (Figure 5).

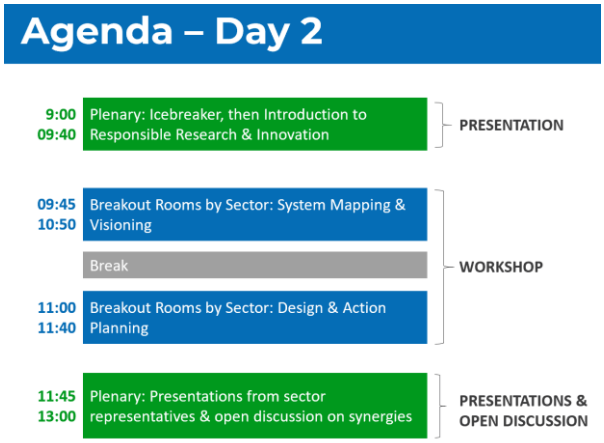

Figure 5: Agenda for Stakeholders' workshop Day 2 focused on RRI

The concepts presented were put in practice through three parallel workshops, each focused on the Case Study (CS) themes: Agriculture & Food Security (CS1, CS2, CS3 & CS4); Water & Infrastructure (CS5 & CS8); and Energy (CS6 & CS7). In order to guide participant through the RRI journey, the virtual structured whiteboard tool "Mural" was used to collaboratively share ideas online in the three breakout rooms (Table 1).

Table 1: RRI breakout groups and corresponding Mural boards

Group Theme	CS	Workshop Mural link
Agriculture & Food security	1, 2, 3 & 4	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1604913045733/d753bb4e5fbd0d361ea9254cc3dd3ae4acf802c3*
Water & Infrastructure	5 & 8	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1605889456740/2d0a4826bbea848694bdf31bed2b6d81f468a17f*
Energy	6 & 7	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1605892252077/62c79e3f5f4b7baaa82876c0a68df4d041b05d24*

Each parallel breakout session was facilitated by two LGI facilitators (Figure 6).

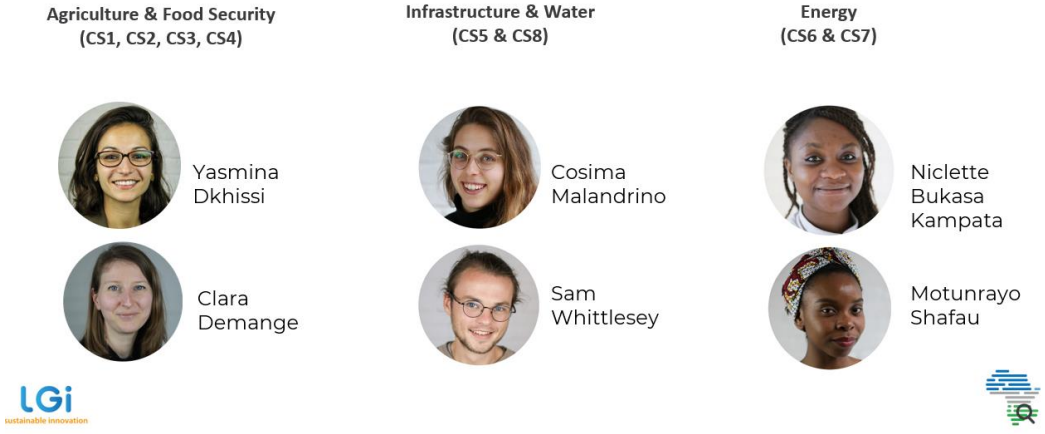

Figure 6: RRI workshop facilitation team

The RRI workshop was designed to provide a **hands-on learning experience in order to familiarise the FOCUS Africa partners and key stakeholders with the concepts of RRI, as well as to initiate a first list of RRI actions**. To do this, the workshop was structured around the five steps of the '5-course meal' methodology described in the FoTRRIS 'Cookbook', a booklet designed to guide on how to co-create RRI projects (FotRRIS, 2018). As illustrated in Figure 7, each course corresponds to one of the five steps of the method.

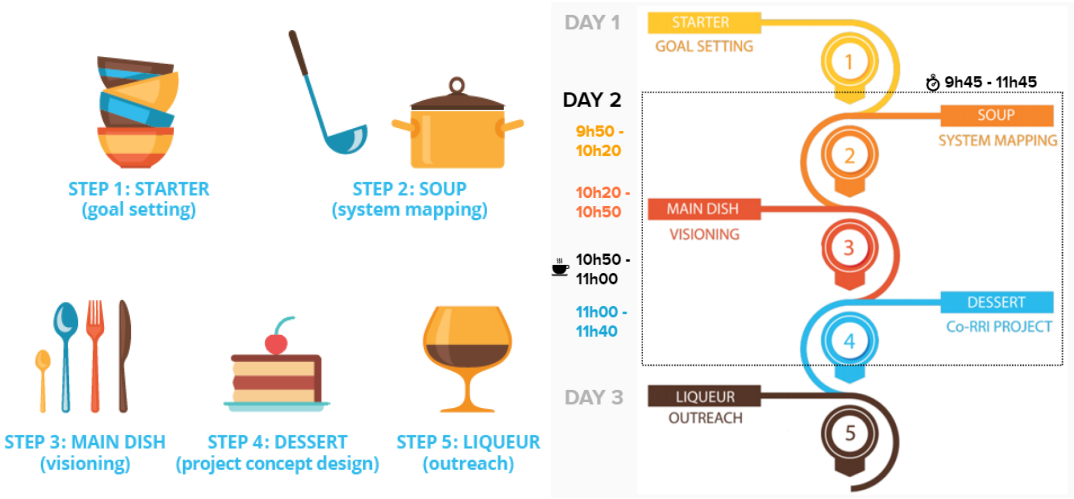

Figure 7: The five steps in the FoTRRIS cookbook and the RRI workshop steps

Step 1 (or *'Starter'*) starts with the definition of the goal that serves as a compass for the co-RRI experiment, and in the context of the FOCUS Africa project, these are the overarching objectives of the case studies. This **first step** consisted in summarising the case study objectives outlined by the case study members during the first day of the internal workshop.

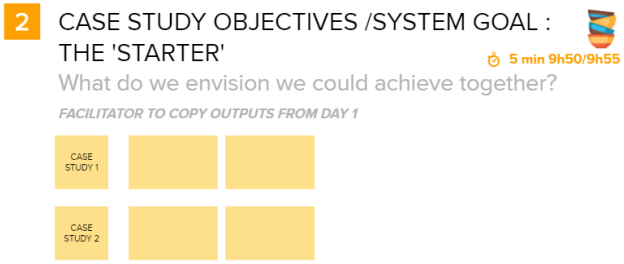

Figure 8: Step 1 or 'Starter' : Goal setting

Step 2 (or '*Soup*') is about elaborating a map of the system under consideration. For this, the **Mapping Innovations on the Sustainability Curve** (MISC) framework is used to discuss how transitions to Responsible Innovations can be accelerated, reflecting on the structural characteristics of sustainable systems. The underlying hypothesis is that, as a methodological framework, it can serve as an outline for a systems map that can allow stakeholders from different corners of the system to reflect on what hinders or facilitates the transition to a Responsible R&I system (Snick, 2017). The theoretical underpinnings of MISC consist in a combination of insights from systems thinking (Meadows, 2008) and process ecology (Goerner, 2009) as well as on literature on economic and monetary innovation, and that allows different actors (representing the 'quadruple helix') to discuss and map innovations for transition in a semi-structured manner, following the outline of a curve that visualises the sustainability parameters of systems. The idea behind this map, illustrated in Figure 9, is that sustainable systems depend on maintaining the balance between **efficiency** and **resilience**. The map helps visualise the actors of the systems;

typically **'regime actors'** that tend to contribute more to the efficiency of the system and **'niche actors'** that bring diversity, interconnections and contribute to the resilience of the system but that would be too divergent if not supported by governance mechanisms that can increase the level of sustainability. This exercise also helps to identify levers of change or barriers that could prevent the system from being or becoming sustainable.

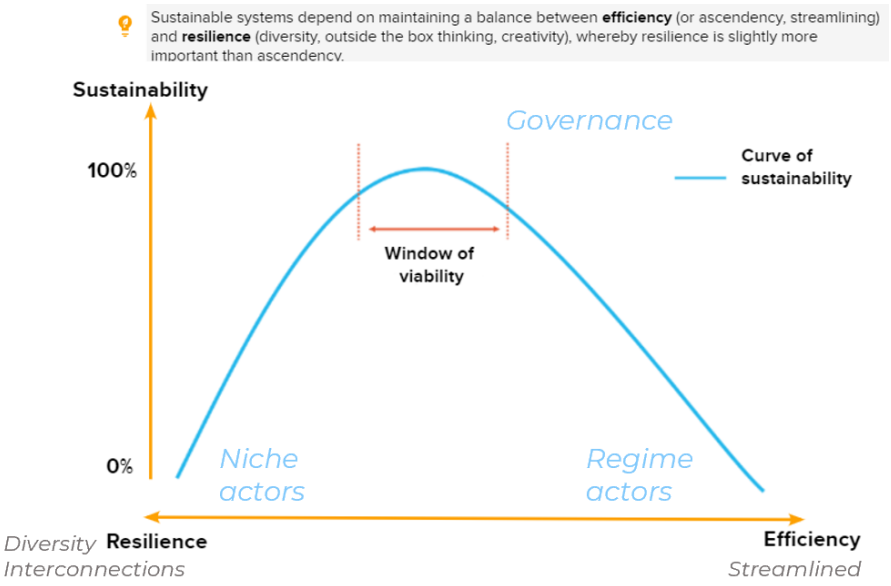

Figure 9: Step 2 or 'Soup' : System mapping with the MISC map

In the context of the FOCUS Africa project and the development of the climate services, this mapping helps initiate a stakeholder mapping by sector and start reflecting upon the current systems dynamics – the context in which the climate service prototypes are being developed. In each breakout room, the facilitators guided the discussion through the following questions:

- What are the main regime organisations (governance institutions, big market players, etc.) that play a role in the current system?
- What other institutions or mechanisms determine the behaviour of these organisations (legislation, international politics, political parties, etc.)?
- Are there other actors playing a role in the system (bottom-up initiatives, both by citizens, Civil Society Organisations (CSOs), local politics, independent researchers or start-ups)?
- What are the feedback loops (balancing and reinforcing feedback loops) to indicate how these actors are stuck, or what allows them to break out, i.e. what are the barriers and drivers in the system?

Step 3 (or '*Main Dish*') consists in envisioning a new future, where the desired goal would be attained, and to understand the path to get there, in other words a list of R&I activities as ways to reach the desired destination. In the context of the FOCUS Africa stakeholder workshop, this means envisioning what the future of the case study would look like if the objectives were met, thus defining a shared vision, followed by actions needed to succeed to reach the ambition.

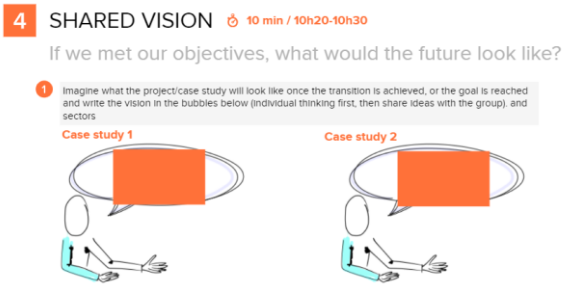

Figure 10: Step 3 or 'Main Dish' : visioning

Step 4 (or '*Dessert*') refers to co-designing the RRI project: defining a work plan, associated resources, project timeline, as well as evaluating the success and impact of the project.

The partners were invited to think about what would need to be done to achieve the future envisioned in Step 3. Partners then listed actions, including RRI actions and potential synergies (Figure 11).

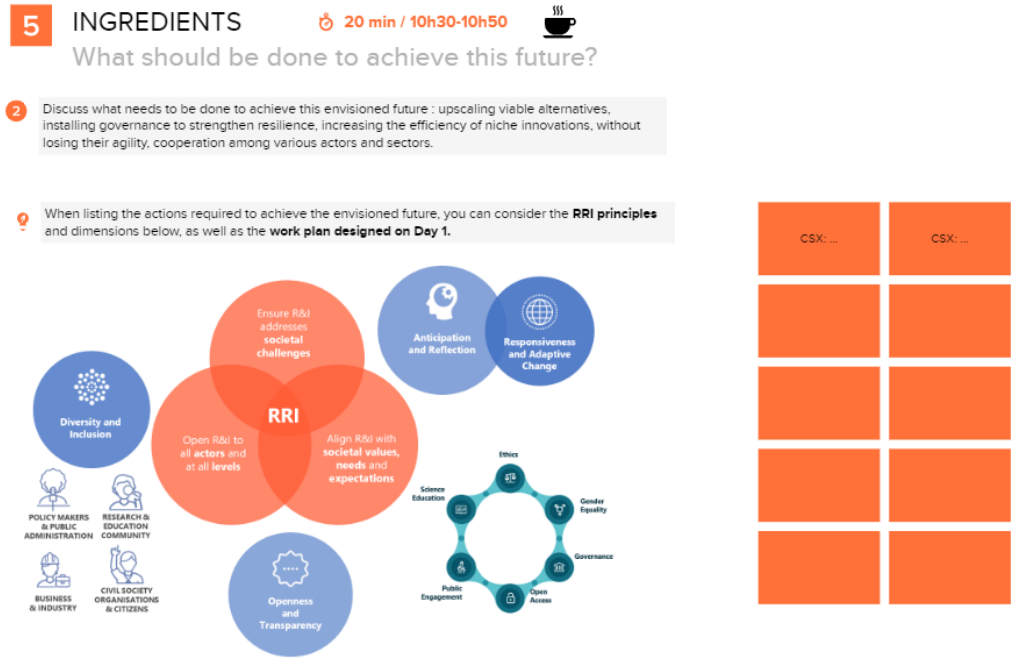

Figure 11: Step 4 or 'Dessert' brainstorming action ideas

Based on the previous steps and the workplans defined on Day 1 of the stakeholders' workshop, a timeline of actions was initiated, keeping in mind the eight key RRI issues. Participants were also invited to start thinking about the potential resources needed to achieve these goals (Figure 12).

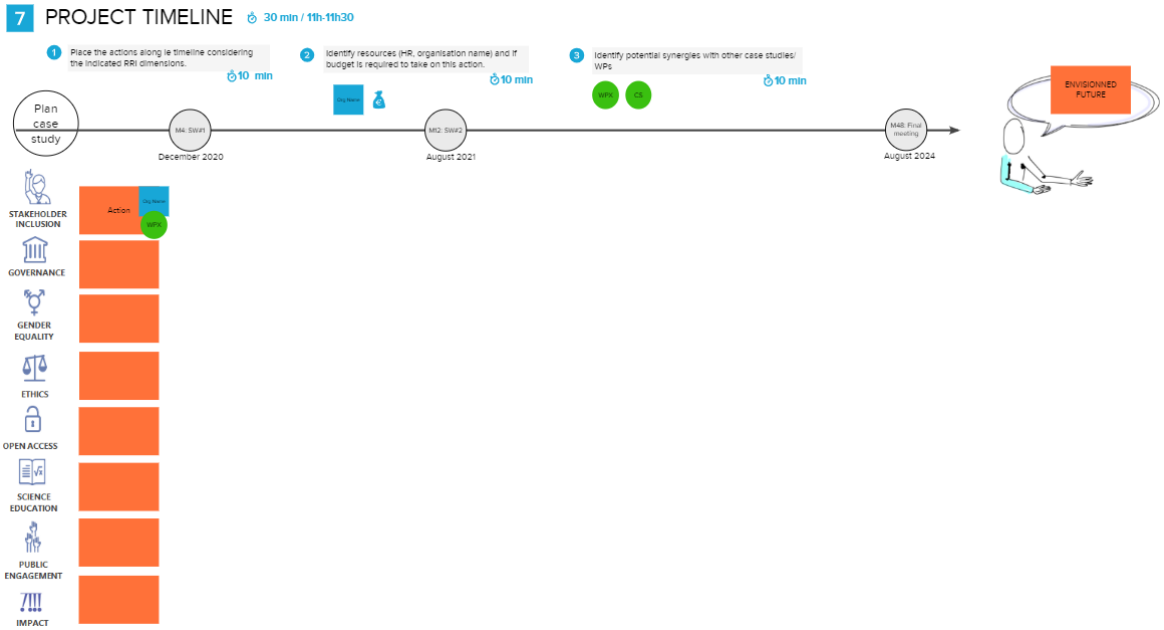

Figure 12: Step 4 or 'Dessert' initiating timeline for the actions

Finally, the participants were invited to reflect upon how success of their case studies will be measured. Creating a link to the socio-economic impact assessment carried out in WP6 and using

the Sustainable Development Goals (SDG) as a framework, partners proposed initial qualitative and quantitative indicators to evaluate the impact and success of the CSs (Figure 13).

Figure 13: Step 4 or 'Dessert' measuring success

The breakout rooms were followed by a plenary discussion where sector representatives presented the key messages that emerged from each room (Figure 14).

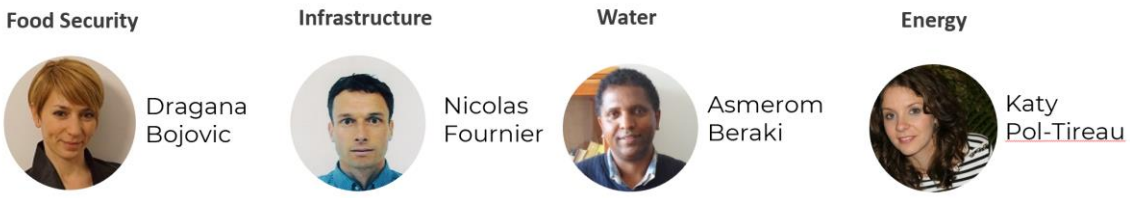

Figure 14: RRI workshop sector representatives

Step 5 (or '*Liqueur*') is about outreach and sharing the experience and results with others. This step was not covered during the RRI workshop sessions themselves, but the following sharing of information during the external stakeholders workshop on Day 3 can be viewed as a component of this last course.

2.3 RRI Action Lists

Following the first stakeholders' workshop focused on learning and applying the principles of RRI, the project partners were asked to complete **Mural RRI Action Lists** offline.

To facilitate the process, mural links were provided. RRI workshop mural links were also provided for reference and a guide on how to complete the action matrices was prepared and shared with the partners (Annex 2).

Case studies were grouped per sector as per during the first stakeholders' workshop, and three Mural boards were prepared, one for each sector, as summarised in Table 2.

Table 2: CS Groups and corresponding Mural boards to complete the RRI Action Lists

Group Theme	CS	Mural RRI Action Lists/Matrices
Agriculture & Food security	1, 2, 3 & 4	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1607932505343/c7156000e8cf67d018dca80c8d598d0212c41235*
Water & Infrastructure	5 & 8	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1609960333049/5d2fec35e045b8ce60210351bf3057b508605eda*
Energy	6 & 7	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1609961320855/747346819be9856d743d533e6adf081fcb76b6a1*

Case study timelines, workplans and action lists initiated during the first stakeholder workshop were summarised on the Mural RRI action lists to help the partners further develop the Action List Matrices based on the existing work.

The objective of this activity was for partners to think about their case study workplans through the lens of the RRI principles, hence reflecting on what actions will be designed, developed and implemented in order to meet these principles. The **RRI Action Matrix** to complete (template in Figure 15) was designed with two axes:

- the eight RRI key issues (*Stakeholder Inclusion, Governance, Gender Equality, Ethics, Open Access, Science Education , Public Engagement, Impact*) in the vertical axis;
- the Work Packages as the horizontal axis, so as to correlate these actions with work already planned as part of the project.

Figure 15: Case Study RRI Action Matrix

3 Workshop outputs

3.1 Food Security

The **Food Security** workshop gathered representatives from the four case studies (CS) in FOCUS AFRICA that work on this topic. Following the methodology outlined in the previous section of this report, participants **first** established the main objectives of their case studies:

- Case Study 1 (South Africa) aims to assess the impact of climate change on food security in a key maize production area of South Africa (North West Province). Understanding the needs of the Land Bank and the agricultural sector in terms of climate information required to manage financial risks stemming from climate change, the CS will develop climate product that informs the Land Bank of its exposure to climate-related risks to facilitate adjusting its credit model
- Case Study 2 (Malawi) and 4 (Tanzania) aim to improve agro-management practices through adding value to the existing agricultural systems; improve risk and vulnerability assessment and adaptation strategies; improve service visibility; and maximise the usability and impact of the service.
- Case Study 3 (Mozambique) aims to develop and provide climate services (crops & climate) to farmers in local communities in Mozambique. It follow a bottom-up approach according to which the focus/starting point (and the final point) is the local smallholder farmers.

The **second step** in the workshop allowed participants to map the environment with which the case study interacts. Mapping the system of the CSs, participants were able to start reflecting on the current dynamics that are leading to challenges and get a grasp of what transitions are needed to restore sustainability. Figure 16 includes actors from all Food Security CSs under study.

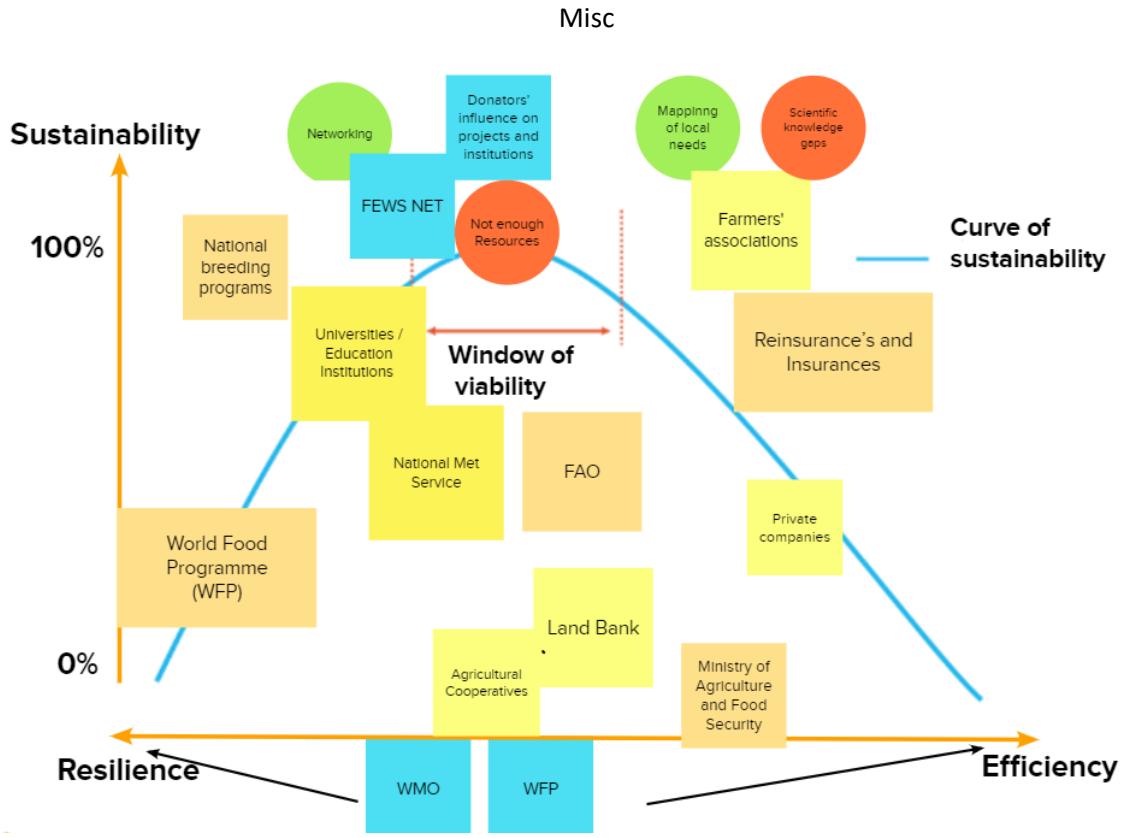

Figure 16: Food Security MISC map

Participants identified the main regime organisations (governance institutions, big market players) and other institutions that play a role in the system. They include international organisation like

the World Meteorological Organisation (WMO) or the World Food Program (WFP) and the Food and Agriculture Organisation (FAO) as well as national governmental authorities like the Ministry of Agriculture and Food Security or the Ministry of Forestry and Natural Resources, or other regulatory authorities. Their placement on the map should refer to their perceived level of resilience, efficiency and sustainability. However, this placement is only indicative as partners' inputs are the result of a quick exercise during the workshop. The Land Bank, agricultural cooperatives, and farmers' associations were identified as actors playing a role in the ecosystem. National Meteorological services as well as university and other educational institutions were positioned at the centre of the curve, close to the viability window.

The map finally shows some of the main barriers and drivers that affect the system. As shown on Figure 16, the mapping of local needs and networking are seen as drivers, while few connections, scarce resources, and scientific knowledge gaps represent the main barriers.

The **third** step of the workshop encouraged the participants to envision the future of their cases studies once their objectives and goals are reached. For CS1 representatives, this would mean robust credit decision-making in the face of climate risks and greater application of climate smart production methods in the agriculture sector. For CS2, this would entail achieving sustainable agro-management practices which increase the overall resilience of the system, efficient and effective (post)harvest management practices, and sustainable climate change adaptation & food security strategies, including support to autonomous (bottom-up) farmers' adaptations. For CS3, it would be a more efficient and sustainable, climate-smart agriculture, improved resilience to climate risks and an enhanced role of smallholder farmers in breeding. Finally for CS4, this would mean a higher agricultural productivity (that does not disadvantage the smallholder farmers), an efficient post-harvest management, an improved use of farmers' time and resources and an improved resilience to climate risks.

Then, partners had the opportunity to start discussing what would need to be done in order to achieve this envisioned future. Participants listed some general actions based on their workplan as well as the RRI dimensions. These actions refer to the inclusion of stakeholders, the impact of climate services and the sustainability of the project:

- Ensure a 50-50 gender balance in Working Groups/Seminar panels;
- Ensure that sustainability, climate and social justice are top priorities;
- Promote sustainable agricultural techniques (agroecology, permaculture, agroforestry) to conserve the soil and improve resilience;
- Stakeholders' inclusion and farmers' participation in the design and evaluation of the project. Climate services should meet the users' needs;
- Make sure the users understand the climate services offered (incorporating the users in the early planning and design). Work on capacity building to strengthen local knowledge
- Build trust and ensure legitimacy of the process;
- Ensure national ownership and formal agreements between national institutions involved in production and dissemination of climate services;
- Make sure the climate services developed can be maintained after the project is over (resources, capacity development...);
- Devise ways to quantify the impact of climate services developed by the project.

More specific to CS1:

- Incorporation of climate-crop risk information into credit lending decisions in a systematic, structured manner;
- Increase mutual understanding between credit lenders and borrowers regarding the climate risks and how this affects lending decisions.

In order to help partners plan their work in the future months, a timeline was provided and the identified actions placed along the timeline (Food Security Group Timeline available in Annex 3).

As a final exercise, partners were asked to indicate ways to measure the success or the impact of their case studies. Both qualitative and quantitative indicators were listed, in some cases based on the SDGs. Partners proposed the following qualitative indicators:

- New partnerships built;
- Mutual and shared knowledge built;
- Gender equality in delivering the service (SDG5);
- New projects stemming out of Focus Africa;
- Requests of training on weather and climate information;
- Responsible production (balanced trade-off of common resources among stakeholders, ie. water) (SDG12);
- A stronger role of smallholder farmer communities (included in policy planning, scientific research – SDG10);
- Satisfaction levels of farmers (surveys/feedback);
- Sustainable techniques against fossil fuel dependent agriculture (SDG 13);
- Examples of best practices/ positive impact of use of climate projections.

As for the quantitative indicators, partners identified the following:

- Improvement of yield/yield resilience in farmer fields (SDG2);
- Number of fields that use sustainable techniques (SDG12);
- Annual Production Resilience Indicator (SDG 2, 13, 15);
- Effective Crop Diversity Indicator (SDG2);
- Increased use of weather forecast on the seasonal time range;
- Number of periodic visits, forecast report downloads;
- Reduced bank losses / farmer bankruptcies due to weather;
- Number of stakeholders (organisations, representatives, individuals) and number of participants in training conducted (SDG4);
- Number of undernourished people in targeted communities (SDG2).

3.2 Water and Infrastructure

The second group of partners involved in the workshop worked on the case studies 5 and 8, respectively those related to **Infrastructure** (Tanzania) and **Water** (Mauritius). As defined during the workshop, the main objectives of the two case studies are:

- CS5: to review the railway design taking into account climate change, and make proposals for resilience against extreme events and to derive operational thresholds for rail infrastructures based on climate projections and non-stationary extreme value analysis.
- CS8: to improve spatio-temporal resolutions to better manage water resources for domestic industrial and agricultural use. The target is to study short range forecast, seasonal forecast and early warning system information.

For these case studies, two system or MISC maps were drawn by participants (Figure 17 and Figure 18).

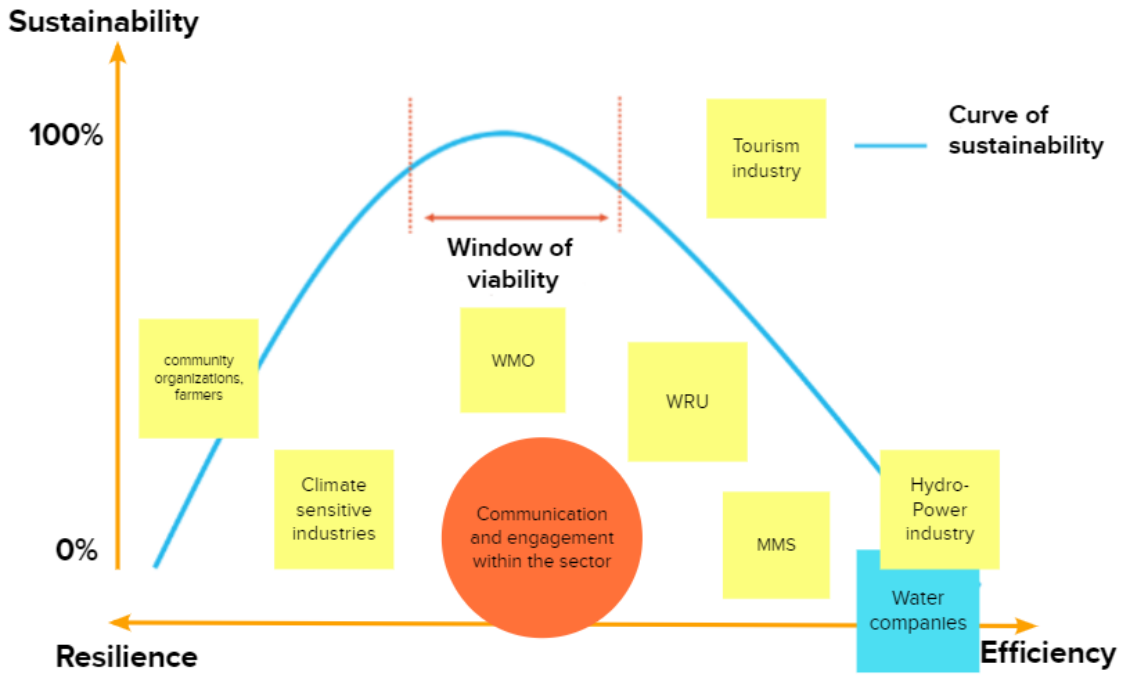

Figure 17: Water MISC map

For the water map, participants found it difficult to identify stakeholders due to the fact that the case study was just beginning to advance. They were nonetheless able to map regime actors (in yellow) and place them on the spectrum. It was noticed that community organisations, farmers and climate sensitive industries were considered to be more resilient, while the tourism industry, water companies and the hydro-power industry were placed on the efficiency side of the map. A key barrier identified for this system was the communication and engagement within the sector (in red).

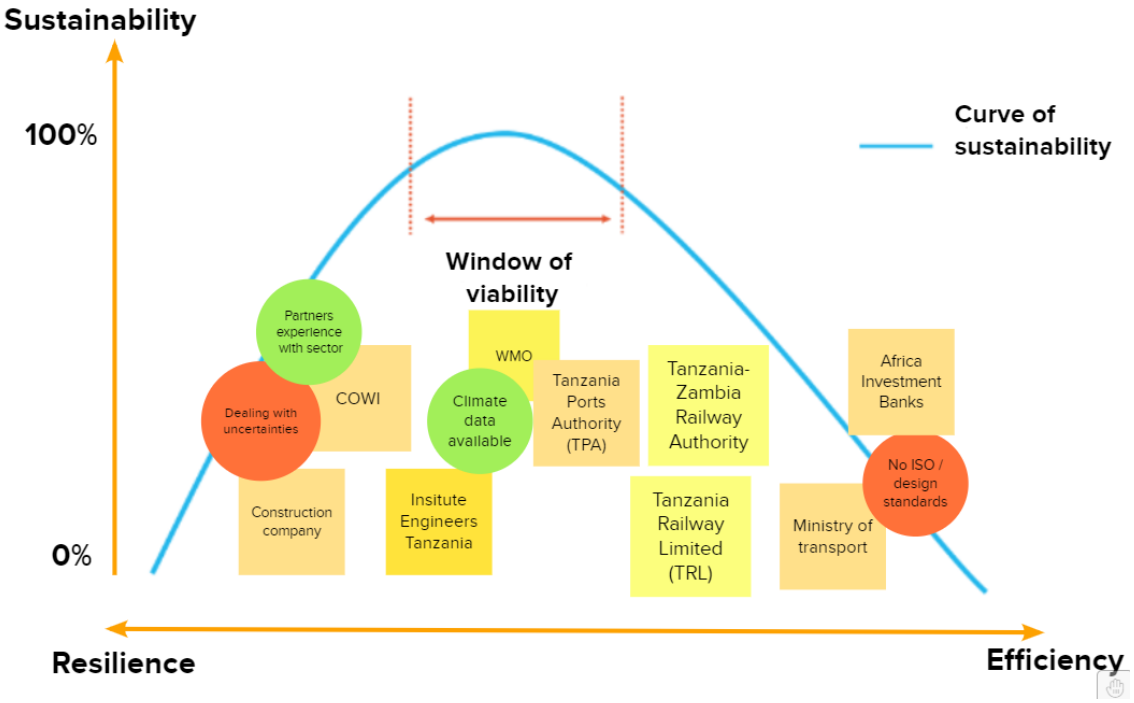

Figure 18: Infrastructure MISC map

Partners involved in the infrastructure case study also struggled to complete the map due to a limited visibility on involved stakeholders as well as a limited knowledge of the field. Some key actors in the infrastructure system were nonetheless identified: COWI (the engineering company in charge of the railway design), construction companies, and the Tanzania National Institute of Engineers. As for more institutional actors like the Tanzania Ports Authority, the Tanzania Zambia Railway Authority, Tanzania Railway Limited, the Ministry of Transport and African Investment Banks, they were mapped as being 'efficient' and less sustainable actors. The map also revealed some barriers and drivers affecting the system. Uncertainties and the absence of ISO design standards for railway infrastructure were identified as barriers; and the experience of project partners in the sector and the climate data available as drivers.

When asked to imagine the case study once its objectives are achieved, partners provided the following descriptions:

- Case Study 5: the CS will allow to update existing infrastructure design standards and it will provide a method applicable to any infrastructure in the region. It will also contribute to increase the awareness of stakeholders and organisations like the World Bank, Investments banks and engineering companies.
- Case Study 8: the CS will improve the availability of high resolution forecasts for domestic, industrial and agricultural water use management, increasing agriculture production due to the accessibility of weather data. It will allow stakeholders to be better prepared to extreme climate events.

In order to plan for the future, a second exercise gave partners the opportunity to start discussing what would need to be done to achieve this envisioned future. Participants listed some general actions based on their workplan as well as the RRI dimensions. These actions refer to the inclusion of stakeholders, the impact of climate services and the sustainability of the project:

- Caste Study 5
    - Ensure transferability and replicability, as well as scalability and sustainability of the product with a range of end-users across the sector;
    - Verify climate science;
    - Design and test climate services with the end-users;
    - Update engineering guidelines with main players;
    - Promote and disseminate results through Work Package 6 and 7 across the region;
    - Ensure that the activity can carry on after the project in terms of raising awareness and promoting the climate service.
- Case Study 8
    - Collect users' requirements and needs and organise engagement activities;
    - Organise capacity-building activities for local actors;
    - Develop appropriate climate products for irrigation;
    - Use gender-informed participatory methods;
    - Use co-production and co-evaluation methods;
    - Design an optimised seasonal prediction product;
    - Assess model skill for different lead-times including extreme climate events;
    - Apply seasonal prediction to water management.

The actions were then placed along the project timeline and related WPs were identified for some of the actions (Water & Infrastructure Group Timeline available in Annex 3).

As a final exercise, partners were asked to indicate ways to measure the success or the impact of their case studies. Using the SDGs as a framework, partners proposed the following indicators:

- Upgrade of infrastructure design guidelines or best practices in industry or/and governmental regulation (SDG 9 - CS5);

- Work collaboratively with industry and government on climate proofing infrastructure design (SD17 - CS5);
- Improved resilience of the built infrastructure to climate change (SDG 13 - CS5);
- Robust design values for railway infrastructure (SDG 9, 11 , 13- CS5);
- Climate extremes (drought/foods) better managed (SDG 13 - CS8);
- Improved water resource allocation of water resources in drought periods (SDG 12 - CS8);
- Improved water decision support season climate information (SDG 6 - CS8);

3.3 Energy

The third group of partners involved in the workshop worked on the case studies 6 and 7, respectively those related to **Energy** in Tanzania and Zambia. As defined during the workshop, the main objectives of the two case studies are:

- CS6: Tanzania Electric Supply Company Limited (TANESCO) and Total (the main energy companies in Tanzania), seek to characterise better how climate variability and change will affect current renewable power generation and future development plans. The case study will demonstrate how we can support these fellow-users to better characterise future weather patterns and extremes for:
  - Total's development planning by analysing the latest climate projections,
  - Operations support by developing area-specific seasonal predictions and incorporate these into TANESCO's hydropower production forecast models;
- CS7: The work of the case study seeks to better characterise the impacts of climate variability and its future changes on hydropower generation mainly in the Zambezi river basin with use of observational and reanalysis data and climate projections. Partners will develop a climate service to support investment decision-making processes and to help operate and maintain existing and future installations using seasonal forecast.

For these case studies, due to extensive discussions and lack of time, participants did not draw the system maps or MISC maps like in the other workshop groups, but they listed the main actors playing a role in the system: Regime organisations; Institutions or mechanisms determining the behaviour of these organisations; Other actors playing a role in the system and the drivers and barriers impacting it. As illustrated in Figure 19, the main regime organisations mentioned are energy companies, development banks, governmental authorities and agencies, and meteorological services. The mechanisms or institutions playing a role in the system are, on the one hand, market mechanisms and, on the other hand, geopolitical forces and national & international environmental objectives and treaties. Other bottom up and third party actors play a role. It is the case for citizens initiatives, environmental organisations and Non-Governmental Organisation (NGOs) or international organisations programs. While finding it hard to answer at this early stage of the process, participants identified some barriers and drivers affecting the system. National policies and governmental institutions were considered as both drivers and barriers. Other barriers identified included population displacement, citizens' access to finance, environmental constraints, cultural barriers and governance models.

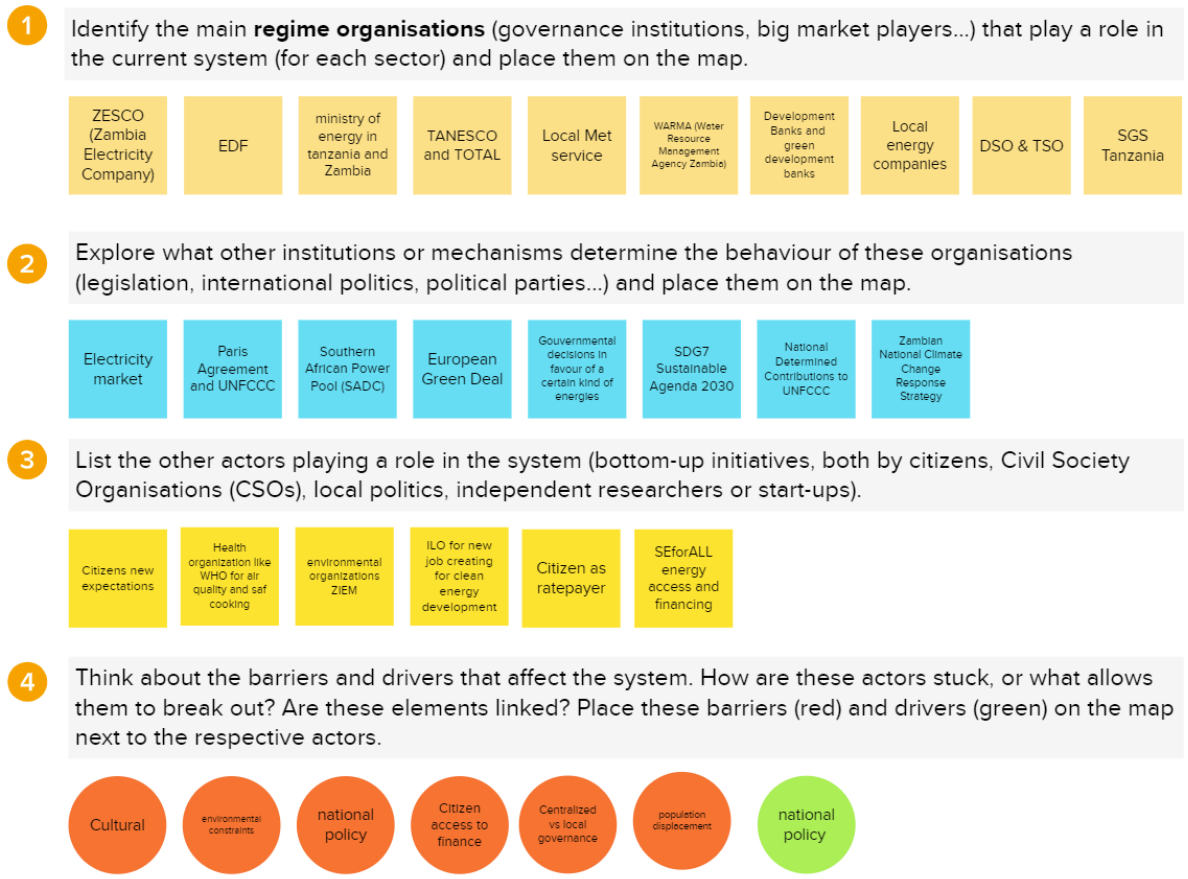

Figure 19: Stakeholder mapping for the Energy case studies

When asked to imagine the case study once its objectives are achieved, partners provided the following descriptions:

- CS6: The National Met Service will be able to deliver climate services operationally to the energy sector for investments and optimisation of energy generation. Social aspects such as the inclusion of local partners will be taken into consideration and will be demonstrated through their actions. The case study will also integrate environmental and social governance dimensions trying not to focus just on the profit but also on the benefits for the people and the environment. A feedback loop in the ecological process will be installed, showing that the RRI methodology is taken into account.
- CS7: Like in the case of CS6, the National Met Service will be able to deliver climate services operationally to the energy sector for investments and optimization of energy generation. Social aspects will also be taken into consideration and the energy provision and security in Zambia will be enhanced.

In order to plan for the future, a second exercise gave partners the opportunity to start discussing what would need to be done to achieve this envisioned future. Participants listed some general actions based on their workplan as well as the RRI dimensions:

- Capacity development - with a focus on empowering women;
- Awareness boosting/ Training for local stakeholders on the use of climate services (Copernicus, climate data);
- Business models provided for existing businesses;
- Financial sustainability;
- Data sharing;

- Establishing a feedback loop (ecological impact of the project - tension between RRI & what existed before).

Finally, the actions were placed along the project timeline, with the actions mostly identified as transversal actions across all WPs (Energy Group Timeline available in Annex 3).

4 RRI Action List/Matrix outcomes

4.1 Case study 1

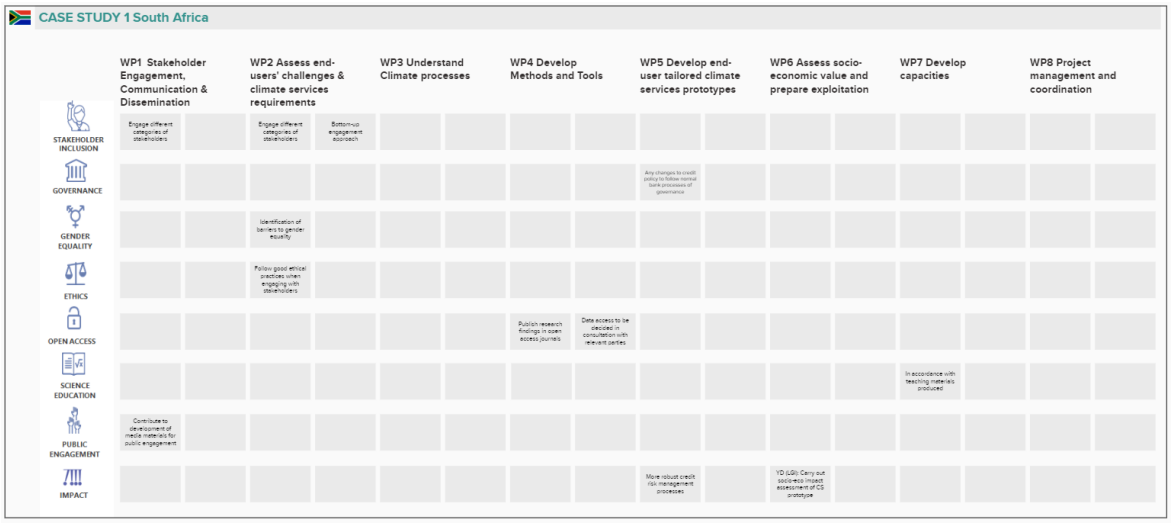

Figure 20: Case Study 1 RRI Action Matrix

Regarding *Stakeholder Inclusion*, CS1 highlights the importance of engaging with different categories of stakeholders (WP1 & WP2) and of pursuing a bottom-up engagement approach. CS1 fosters changes to credit policy to follow normal bank processes and *Governance* in the development of climate services prototypes (WP5). CS1 proposes to identify barriers to *Gender Equality* and follow good *Ethics* practices when engaging with stakeholders as part of the assessment of end users' challenges and CS requirements (WP2). CS1 intends to publish research findings in *Open Access* journals and give access to data after appropriate consultation with relevant parties (WP4 develop methods and tools). *Science Education* will be linked to WP7 focused on Building Capacity and will be carried out in accordance with teaching materials produced as part of WP7. CS1 commits to contributing to developing media materials for *Public Engagement* (WP1). CS1's key contribution will be undertaken through the development of a more robust credit management system in WP5 and its socio-economic *Impact* will be assessed through WP6.

4.2 Case study 2

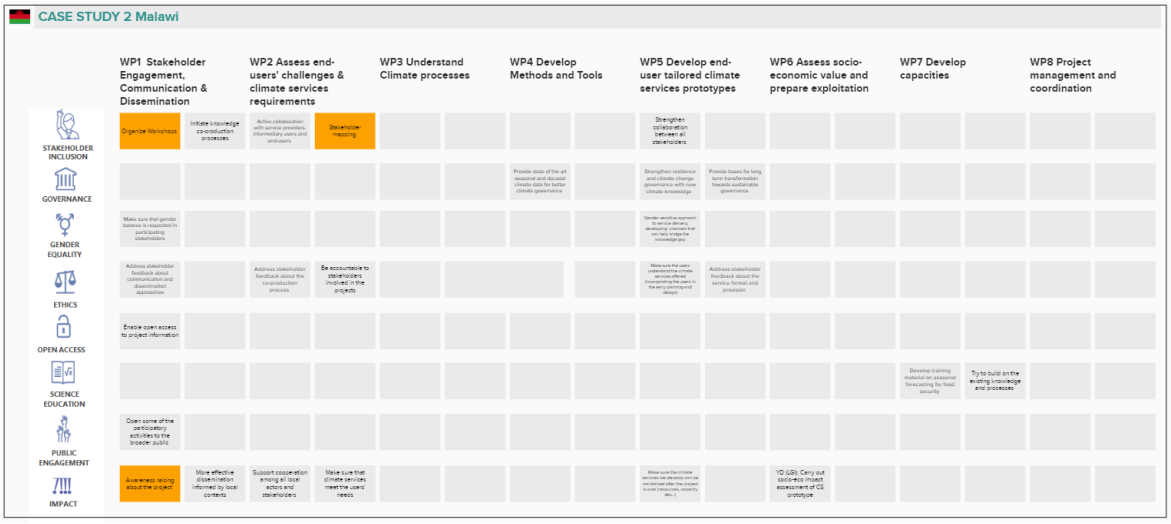

Figure 21: Case Study 2 RRI Action Matrix

Stakeholder Inclusion activities identified by CS2 include: organising workshops and initiating knowledge co-production processes (WP1), active collaboration with service providers, intermediary and end-users, stakeholder mapping (WP2), and strengthening collaboration between all stakeholders (WP5). CS2 identifies providing state of the art seasonal and decadal climate data for better climate *Governance* (WP4), strengthening resilience and climate change governance with new climate knowledge, and providing bases for long-term transformation towards sustainable governance (WP5). Regarding *Gender Equality*, CS2 wants to ensure that gender balance is respected in participating stakeholders (WP1), that gender-sensitive approaches are taken to service delivery, and that channels should be developed to help bridge the knowledge gap (WP5). Regarding *Ethics*, CS2 highlights that stakeholder feedback about communication and dissemination approaches (WP1), the co-production process (WP2) and the service format and provision (WP5) should be addressed. CS2 proposes that partners should be accountable to stakeholders involved in the projects (WP2) and make sure that the users understand the climate services offered, with efforts made to involve the users in the early planning and design. CS2 will enable *Open Access* to project information (WP1). Regarding *Science Education*, CS2 highlights the need to develop training material on seasonal forecasting for food security and try to build on existing knowledge and processes (WP7). CS2 proposed to open some of the participatory activities to the broader public to foster greater *Public Engagement*. Finally, CS2 lists activities to maximise *Impact*: raising awareness about the project and promote more effective dissemination informed by local contexts (WP1), supporting cooperation among all local actors and stakeholders and ensuring that climate services meet the users' needs (WP2); making sure the CS developed can be maintained after the project is over (resources, capacity development) (WP5, WP7) and conducting the socio-economic Impact Assessment (WP6).

4.3 Case study 3

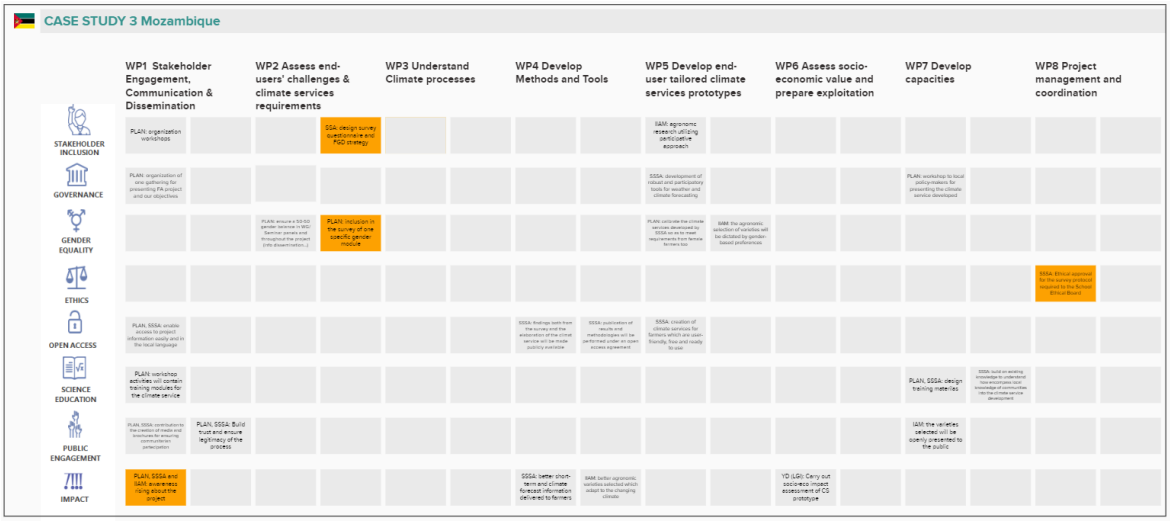

Figure 22: Case Study 3 RRI Action Matrix

Stakeholder Inclusion activities proposed by CS3 partners include: organising workshops (WP1); designing engagement survey questionnaires, developing the Focus Group Discussion (FGD) strategy (WP2); and conducting agronomic research utilising participative approaches (WP5). Regarding *Governance*, activities will include the organisation of one gathering to present the FOCUS Africa project and its objectives to the smallholder farmers (WP1); the development of robust and participatory tools for weather climate forecasting (WP5); and the organisation of a workshop to local policy makers to present the climate service developed (WP7). To foster *Gender Equality*, CS3 proposes to ensure a 50-50 gender balance in the working groups and seminar panels and throughout the project. The engagement survey specifically includes one module focused on gender and reviewed by PLAN (WP2). Efforts are placed from the start of the project to calibrate the climate services developed by Sant'Anna School of Advanced Studies (SSSA) so as to meet requirements from female farmers too and the agronomic selection of varieties will be dictated by gender-based preferences (WP5). Regarding *Ethics*, ethical approval for the survey protocol is required by the School Ethical Board (WP8). CS3 partners will enable *Open Access* to project information easily and in local language (WP1); findings both from the survey and the elaboration of the CS will be made publicly available, and publications of results and methodologies will be performed under an open access agreement (WP4). Finally, CS3 partners propose to create climate services for farmers which are user-friendly, free and ready to use (WP5). According to CS3 partners, *Science Education* will encompass workshop activities which will contain training modules for the CS (WP1). These training materials will be designed as part of WP7 and will be built on existing knowledge to understand how to encompass local knowledge of communities into the CS development (WP7). *Public Engagement* will be promoted by creating media and brochures for ensuring communitarian participation, whereby building trust will be key to ensuring the legitimacy of the process (WP1). Also, the crop varieties selected will be openly presented to the public (WP7). Finally, the *Impact* of the project will be maximised by raising awareness about the project (WP1); delivering better short-term and climate forecast information to farmers, selecting better agronomic varieties which adapt to the changing climate (WP4); evaluating the socio-economic impact as part of WP6.

4.4 Case study 4

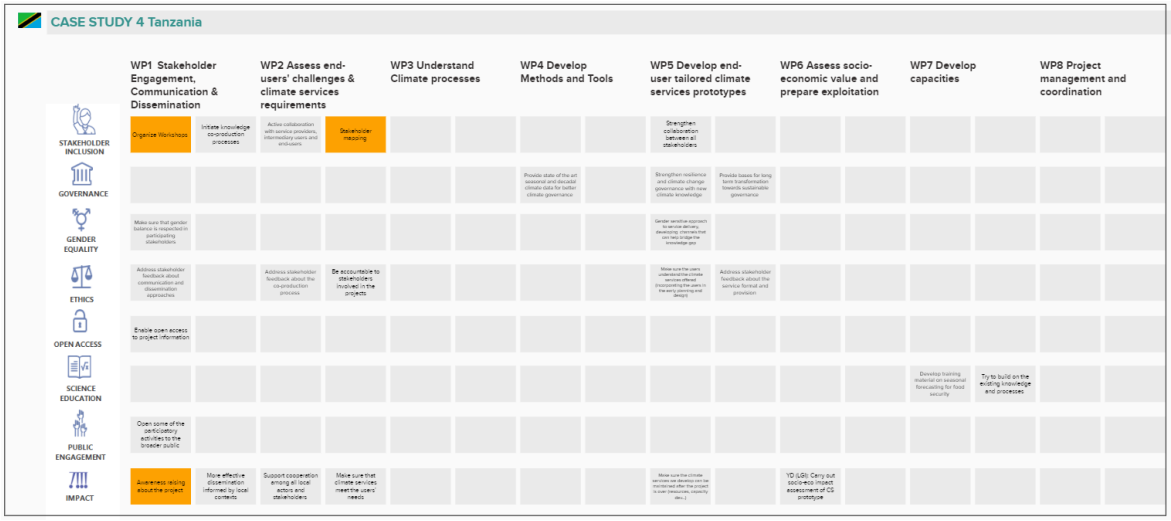

Figure 23: Case Study 4 RRI Action Matrix

Stakeholder Inclusion activities identified by CS4 include: organising workshops and initiating knowledge co-production processes (WP1), active collaboration with service providers, intermediary and end-users, stakeholder mapping (WP2), and strengthening collaboration between all stakeholders (WP5). CS4 identifies providing state of the art seasonal and decadal climate data for better climate *Governance* (WP4), strengthening resilience and climate change governance with new climate knowledge, and providing bases for long-term transformation towards sustainable governance (WP5). Regarding *Gender Equality*, CS4 wants to ensure that gender balance is respected in participating stakeholders (WP1), that gender sensitive approaches are taken to service delivery, and that channels should be developed to help bridge the knowledge gap (WP5). Regarding *Ethics*, CS4 highlights that stakeholder feedback about communication and dissemination approaches (WP1), the co-production process (WP2) and the service format and provision (WP5) should be addressed. CS4 proposes that partners should be accountable to stakeholders involved in the projects (WP2) and make sure that the users understand the climate services offered, with efforts made to involve the users in the early planning and design. CS4 will enable *Open Access* to project information (WP1). Regarding *Science Education*, CS4 highlights the need to develop training material on seasonal forecasting for food security and try to build on existing knowledge and processes (WP7). CS4 proposed to open some of the participatory activities to the broader public to foster greater *Public Engagement*. Finally, CS4 lists activities to maximise *Impact*: raising awareness about the project and promote more effective dissemination informed by local contexts (WP1), supporting cooperation among all local actors and stakeholders and ensuring that climate services meet the users' needs (WP2); making sure the CS developed can be maintained after the project is over (resources, capacity development) (WP5, WP7) and conducting the socio-economic Impact Assessment (WP6).

4.5 Case study 5

Figure 24: Case Study 5 RRI Action Matrix

Stakeholder Inclusion activities identified by CS5 span across WP2, in particular Task 2.1 for the collection of end-users requirements, WP4 with Tasks 4.3 and 4.5 with the application multi-model climate projections and derivation infrastructure design values, and WP5 with the development, testing and delivery of case study prototypes (5.1, 5.2 and 5.3). CS5 proposes to highlight *Science Education* with WP3 and Tasks 3.1 and 3.3 on the selection and analysis of the climate projections; as well as WP4 regarding the seasonal forecast (T4.1) and climate projections (T4.2) quality assessments. The socio-economic *Impact* of CS5 will be assessed through WP6.

4.6 Case study 6

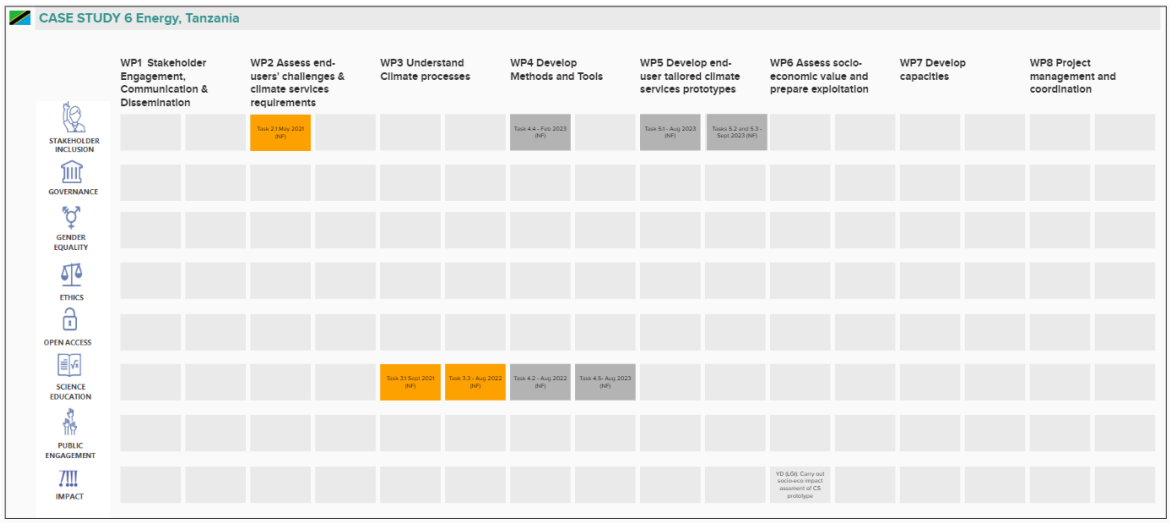

Figure 25: Case Study 6 RRI Action Matrix

Stakeholder Inclusion activities identified by CS6 span across WP2, in particular Task 2.1 for the collection of end-users requirements, WP4 with Tasks 4.3 and 4.5 with the application of multi-model seasonal and climate projections, and WP5 with the development, testing and delivery of case study prototypes (5.1, 5.2 and 5.3). CS6 proposes to highlight *Science Education* with WP3 and Tasks 3.1, 3.2, 3.3 regarding the selection and analysis of seasonal and climate projections; as well as WP4 regarding the seasonal forecast (T4.1) and climate projections (T4.2) quality assessments. The socio-economic *Impact* of CS6 will be assessed through WP6.

4.7 Case study 7

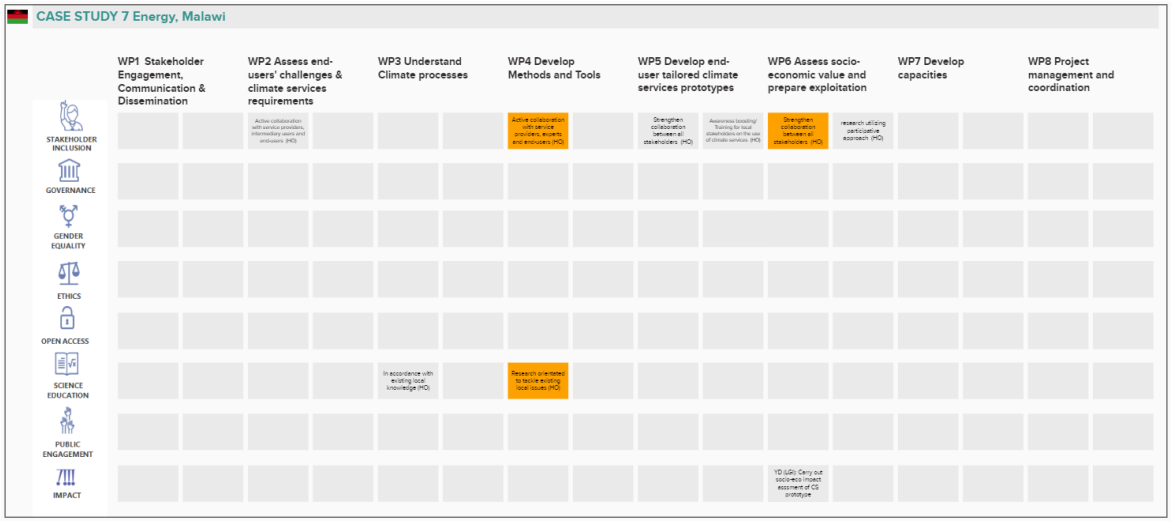

Figure 26: Case Study 7 RRI Action Matrix

CS7 partners identified active collaboration with service providers, intermediary users and end-users (WP2, WP4); and strengthening collaboration between all stakeholders (WP5, WP6) as key activities to foster *Stakeholder Inclusion*. Boosting the awareness boosting and organising training for local stakeholders on the use of climate services (WP5); as well as the promotion of research utilising participatory approaches (WP6) were also included as part of RRI actions. CS7 partners propose to foster *Science Education* in accordance with existing local knowledge (WP3) and to orientate the research to tackle existing local issues (WP4). The socio-economic *Impact* of CS7 will be assessed as part of WP6.

4.8 Case study 8

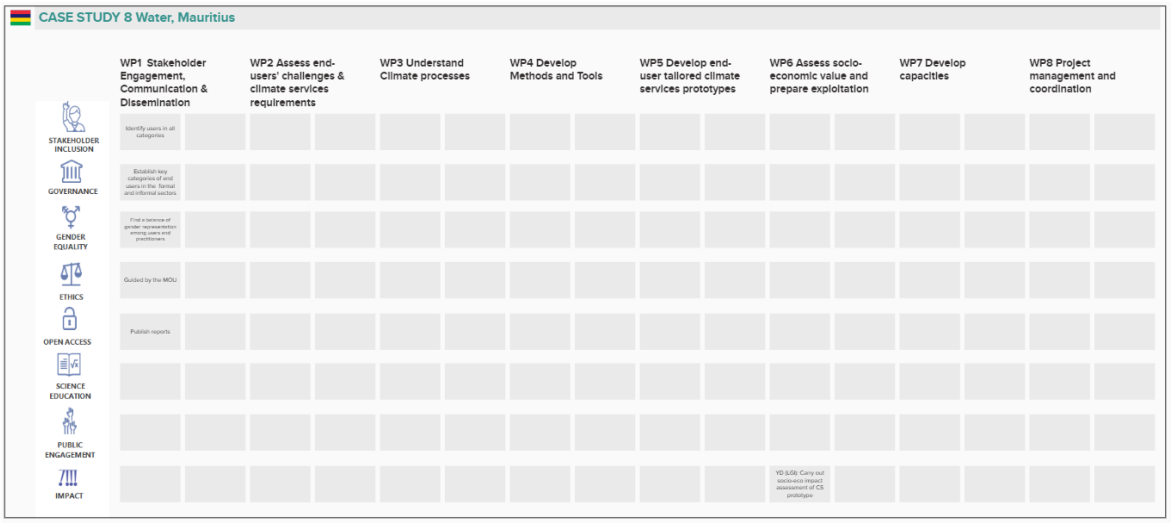

Figure 27: Case Study 8 RRI Action Matrix

Stakeholder mapping and identification of users in all stakeholder categories constitutes the first step of *Stakeholder Inclusion*. Regarding *Governance*, CS8 partners propose to establish key categories of end-users in both the formal and informal sectors. *Ethics* will be guided by the Memorandum of Understanding agreed upon between the research partners. CS8 partners propose to publish reports in *Open Access*. Finally, the socio-economic *Impact* of CS8 will be assessed as part of WP6.

5 Recommendations

After having dedicated a closer look at the FOCUS AFRICA case studies, this final section aims at listing project-wide recommendations for the inclusion of a Responsible Research and Innovation approach along the project lifetime.

Ensuring the fulfilment of the project expected impacts

As part of the project proposal, the consortium agreed on meeting a set of objectives in order to ensure the positive social, economic and environmental impact of the actions planned in FOCUS Africa. We hereby take inspiration from the project impact objectives and detail their potential to lead the way towards RRI:

- Impact #1 – Better policy making for climate adaptation in project and other countries, including Europe;
- Impact #2 – Increased scientific capacity in the region and strengthened support for international scientific assessments;
- Impact #3 – Stronger adaptive capacity and climate resilience in project countries;
- Impact #4 – Better informed and connected end-user communities;
- Impact #5 – Improved women's access to climate services;
- Impact #6 – Increase uptake and sustainability of the developed climate services.

While Impact #5 directly addresses gender equality, an effort is made to include this transversal dimension in all impact categories. For every impact category, a list of actions that contributes to achieving the desired impact of the project is proposed. Under each impact category, the respective RRI key issues are listed, contextualising the objectives of the call for proposals in the RRI framework. This exercise aims to help project partners see the bigger picture – a way to exit the WPs, case-studies, and task silos and think about their contributions as meaningful steps towards greater project goals.

Impact #1 - Better policy making for climate adaptation in project and other countries, including Europe
The first impact objective is related to the following RRI issues, as presented in the introduction of this deliverable: *Stakeholder Inclusion, Governance, Open Access, Public Engagement, Impact*. For a better policy-making that acts toward climate adaptation at the national and international scales, the project should work to include a wide variety of stakeholders from the public, private, and civil society realm. Ensuring that innovative structures of governance are in place will also allow for a multi-stakeholder approach to permeate the existing decision-making systems. Finally, adopting an open access policy for project results will allow stakeholders to learn from the project lessons and build their policies around the evidences and knowledge developed within FOCUS Africa. Looking closely to the project WP descriptions, the following actions to promote better informed decision-making able to foster climate adaptation, were identified: • **WP1**: Ensure gender equal participation of a wide array of actors in the stakeholders workshops (1.1); promote dissemination and communication actions for engagement through publications, website articles, presentations at conferences, and policy briefs in order to spread the results developed throughout the project (1.3 and 1.4). • **WP2:** Promote dissemination activities targeted at policy-makers to share results of reports on climate risk and vulnerability assessments to better understand the risks of climate events in the region and beyond (2.2).

- **WP3:** Disseminate and present the results of the selection and analysis of high-resolution climate projections and seasonal forecasts of the region and the regional extreme events identification and variability.
- **WP5:** Disseminate the results on prototypes developed as well as pilot case studies implemented (Final report to describe the implementation and use of each of the climate service prototype for all of the CS).
- **WP6:** Ensure that case studies have a tangible impact on local, national and international strategies for climate adaptation; ensure that case studies interact with policy-makers on a regular basis; disseminate the results of the impact assessment, the market analysis, scalability and replicability, and exploitation strategy.
- **WP7:** Coordinate the dissemination, capacity building and training activities by developing materials and online resources particularly targeting policy-makers both at the local, national and international level.

Impact #2 – Increased scientific capacity in the region and strengthened support for international scientific assessments

The second impact category is closely related to the following RRI issues: *Stakeholder Inclusion, Open Access,* and *Science Education*. The project will indeed encourage participation of fellow-users and scientific community members through regular events and conferences; it will work to ensure that its results can be accessed openly by the scientific community; and it will provide capacity-building opportunity, involving both local and international partners.

Looking closely to the project WP descriptions, the following actions to increase scientific capacity and strengthen support for international scientific assessments, were identified:

- **WP1**: At every stakeholders' workshop, include informational sessions on the project advancement and invite local, national and international science community. Ensure gender equality in invitation and participation lists. Share results but also provide space for debate and co-design of climate services by stakeholders. These events serve as impact assessment opportunities for both the project as a whole and the services developed. Make sure to reach important stakeholders and national and international scientific networks through the communication and dissemination campaigns. Coordinate with project partners to keep the website up to date with project scientific proceedings, as well as with project publications and deliverables.
- **WP3:** Openly communicate and disseminate projects results in terms of climate system understanding, use of predictions and projections, and regional extreme events identification. Contribute to knowledge development at the international level by participating in the Intergovernmental Panel on Climate Change (IPCC) assessments, FAO reports, and other initiatives in this field of studies.
- **WP4 and 5**: Openly communicate and disseminate project results of innovative tools, methods and approaches for characterising seasonal forecasts, decadal predictions and climate projections (WP4); document and share the development and prototypes of climate services developed for each case study (WP5). Make sure to include gender equal and diverse stakeholders in the prototype co-design and testing activities, with a particular focus on fellow-users and climate scientists from the local and national context at study.
- **WP6:** Include representatives for a variety of disciplines in the local scientific community in the design of the impact assessment methodology and ask for feedbacks; evaluate the impact of project scientific achievements through focus groups and interviews (gender-balanced/ not only climate scientists but also social scientists); evaluate the capacity-building and dissemination activities of the case-studies, with a focus on open-access, gender-equality and geographic scale (local, national, international).

- **WP7:** Assess training needs of regional climate services providers, upgrade training curricula and develop and test people-centred training materials that take into account socio-economic, cultural and gender inequalities**.** Develop online resources that are tailored to local needs and are integrated in teaching/capacity-development programs. Ensure their sustainability in the long-term beyond the Focus Africa project by identifying local organisations and mechanisms to sustain the capacity building in the local regions.
- **WP8:** Encourage the project open data requirements and facilitate open access of project results.

Impact #3 - Stronger adaptive capacity and climate resilience in project countries

The third impact category is closely related to the following RRI issues: *Stakeholder Inclusion & Public engagement, Governance,* and *Science Education*. The project aims to develop climate services in a collaborative way by tailoring to and engaging with a variety of local, national and international stakeholders in order to improve the adaptive capacity and resilience in project countries. Innovative governance structures will be necessary in order to promote the integration and systematic use of these services, methods and tools in decision-making systems. Finally, key in improving adaptation and resilience is the capacity-building, training and dissemination of climate services for a variety of actors and fellow-users in the sectors value chains (water, food security, infrastructure, energy).

Looking closely to the project WP descriptions, the following actions were identified to increase adaptive capacity and resilience:

- **WP1 and WP7:** Stakeholders' workshops and consultations will serve as key tools to understand the challenges and needs of local and national users. Better understanding the context will allow case studies to deliver more efficient and impactful services. The communication, dissemination and capacity-development activities should moreover focus on facilitating the uptake of adaptation strategies by local, regional and national authorities as well as international initiatives working on the areas targeted by using the sectorial information and alert systems developed by the project. Trainings of members of national climate and meteorology agencies through online courses and modules (WP7) will further support the capacity building effort of the project.
- **WP2-3-4-5:** The key contribution of the project is the study and analysis of fellow users' challenges, risks, and vulnerabilities; the understanding of local climate characteristics; and the demonstration of the range of climate services through the eight case studies, strategically targeting industry and other users across four sectors and five countries. In order to truly have an impact on the resilience of the countries at study, it is important that these services are truly tailored to local needs, become accessible to all types of users (especially those that are most impacted by climate change and most vulnerable from a socio-economic point of view) and continue to be implemented after the end of the project. In order to reach this objective, including all types of stakeholders and ensuring gender balance in interviews and focus groups is essential (T2.1). This is key for case-studies development activities too (T5.2 – 5.3).
- **WP6:** Assessing the socio-economic impact of the climate services developed represents a key tool to ensure the achievement of impact #3. This WP should further work to allow the scaling up of these services to the other countries and major players in the region (private, public, international) who use decision-making models based on climatology (T6.4-6.5).

Impact #4 - Better informed and connected end-user communities
The fourth impact category is closely related to the following RRI issues: *Stakeholder Inclusion* and *Public Engagement; Science Education,* and *Open Access*. Stakeholder inclusion and public engagement represent key RRI principles to successfully inform and engage fellow users' communities in adopting climate services that can help them better adapt to climate extreme events. On the other hand, inclusion and engagement activities should be supported by a capacity building effort aimed at transferring scientific knowledge to the local and international community. In this sense, opening the access to key project results becomes instrumental to its success in better informing user communities. Looking closely to the project WP descriptions, the following actions were identified to promote this impact objective: • **WP1:** Foster connections and networking opportunities with similar initiatives beyond the project organisation. Maximise the impact of stakeholders' workshop as opportunities to better inform local communities and invite a diverse set of participants. Develop interactive communication supports that are able to reach the broader public; get in contact with local networks in order to disseminate information through their channels. • **WP2-3-4-5:** Maximise the benefits of fellow users' communities by collaborating with scientists, researchers, climate services providers, institutions, and service users throughout the phases of needs and risk assessment, projection, and prototype development. • **WP6:** Co-design impact assessment with project partners, periodically evaluate the project implementation with respect to SDG objectives and share results with partners. • **WP7:** Organise capacity-building activities that truly empower fellow user communities beyond informing them of the project advancements.
Impact #5 - Improved women's access to climate services
The fifth impact category is closely related to the following RRI issues: *Gender Equality, Ethics, Stakeholder Inclusion* and *Public Engagement.* Applying the RRI gender equality principle implies the uptake of a systematic and integrated approach that permeates the entire project, in all of its tasks, responsibilities and impacts. The project proposal had already taken steps to make sure that gender equality was put into practice throughout the project: "During project implementation, FOCUS-Africa will ensure that the team responsible for conducting the socio-economic assessment (WP6) is gender balanced. In addition, gender-balance will also be targeted in the interview panels consulted for the need collection (WP2) and the impact assessment (T6.2 and T6.3). Furthermore, a special focus will be put on existing gender biases during the evaluation of the socioeconomic situation (T6.2.1). The design of climate services (WP5) as well as exploitations strategies (T6.5) will consider gender-specific needs, particularly by identifying dissemination channels that address the women-specific constraints."

However, looking closely to the project work packages descriptions, and taking into account the learning from the first year of the project, it is important to highlight the importance of having a gender foresight and take the following actions to promote this impact objective:

- Ensure that gender implementation is not restricted to a binary framework, and welcome, respect and make space an array of gender identities by targeting diverse communities and favouring gender-neutral wording;
- Ensure balanced participation in all project events, both in its panels and audience;
- Ensure balanced participation in project meetings, actively engaging with less outspoken members;
- Ensure the presence of a climate of respect and non-discrimination in all projects tasks and activities by previously reminding this code of conduct and condemning occurrences that may arise;
- Ensure that stakeholders inclusion and public engagement activities with fellow-users particularly make an effort in understanding gendered practices, needs and behaviours in order to be able to better tailor project dissemination, capacity building, and co-design activities;
- Ensure that project members organising engagement activities, surveys and interviews make an active effort in targeting a variety of genders and plan these activities in order to accommodate to local gendered organisations of time.

Impact #6 – Increase uptake and sustainability of the developed climate services

The sixth impact category is closely related to the following RRI issues: *Stakeholder Inclusion and Public Engagement, Governance* and *Impact.*

Indeed, increasing the uptake of the project's solutions in surrounding regions and beyond represents a key objective with a grand potential for contributing to climate risks response in the African continent. Stakeholders' inclusion and public engagement represent key tools to ensure that climate services meet fellow-users' requirements. Addressing and analysing the different governance frameworks of the region further holds the potential to increase the project's ability to integrate climate information in local decision-making processes.

Looking closely to the project work packages descriptions, the following actions were identified to promote this impact objective:

- **WP1:** Foster the uptake of the project methodologies, findings, and prototypes by using the User Advisory Board as a lever for replicability in and outside the SADC region. Advocate for and demonstrate replicability capacity during stakeholders' workshops by organising sessions with local players and decision-makers.
- **WP2-3-4-5:** Make sure to continuously assess the analyses and prototypes developed in the project by forecasting their socio-economic implications as well as their adaptability to local contexts. Truly facilitate stakeholders' participation, from the design to the implementation phase.
- **WP6:** Accompany the assessment of the project impact by shedding light on the socio-economic factors contributing to the successful uptake of the climate services; steer project partners' actions towards positive impact for fellow users' communities; ensure the uptake and replicability of the solutions by drafting exploitation strategies together with potential market players interested as well as representatives of civil society, academia, private and public organisations, in order to balance marketability with sustainability.

- **WP7:** Harness the potential of capacity building activities as tools to transfer knowledge to local stakeholders and decision-makers; make sure to include private actors, public authorities, research communities, and civil society representatives.

6 Concluding remarks

As defined by the EC's dedicated Expert Group, RRI is a comprehensive approach of proceeding in research and innovation in ways that allow all stakeholders to be involved at an early stage in order to build projects, products and services that adequately address the grand societal challenges.

Based on review of state-of-the-art literature and previous EU-funded projects focused on RRI, ***stakeholder inclusion, ethics, gender equality, governance, open access, public engagement, science education,*** and ***impact***, were identified as key issues and used to frame the RRI discussions within the FOCUS Africa project. These issues were first considered to brainstorm RRI ideas during the workshop sessions, and then for building the RRI action lists afterwards.

A RRI workshop was designed and organised to provide a **hands-on learning of the RRI concepts and components** during the first stakeholders' workshop. Three parallel breakout sessions were held online, each focused on the case study themes: Agriculture & Food Security (CS1, CS2, CS3 & CS4); Water & Infrastructure (CS8 & CS5); and Energy (CS6 & CS7). Initial lists of RRI actions were identified by case study teams, and were subsequently enriched by completing RRI action mural matrices. In order to help identify RRI actions in line with the existing activities of the project, the actions were envisaged through the lens of the project WPs as well as they eight key issues.

It was apparent that some case studies already embedded **stakeholder inclusion** and several of the key issues within the design of the climate services, and that for some, more will need to be done to integrate the RRI principles. Stakeholder inclusion must be at the core of the design of the climate services through the project work packages WP2, WP3, WP4 and WP5, their impact assessment and exploitation through WP6, as well as through the capacity building enabled by WP7. This must remain a priority despite the additional challenges brought by the COVID-19 pandemic and the difficulties to interact in person and travel to the various regions.

Based on the RRI actions identified by the CS teams and analysis of WP activities through the RRI lens, a set of recommendations were proposed using the **six FOCUS Africa impact objectives** as framework to maximise the alignment with the project's overarching ambition. Although Task 1.5 comes to an end with the submission of this *Report on the introductory session on Responsible Research and Innovation,* it is essential that the notions and recommendations brought forward by the RRI analysis serve as a guiding compass for the rest of the FOCUS Africa project.

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8 Annex

8.1 Annex 1

Lessons and recommendations from the Weather and Climate Information Services for Africa - WISER programme

Recommendations	Link with RRI & Focus Africa WP
1. Ring-fence an inception phase to ensure relevant planning 1. Consider the level of co-production of climate services in WISER as 'minimum viable' level and seek to extend this aspect significantly in future programmes: it will take time to show results but when results are achieved they are considerable. 2. Prioritise user engagement in the co-design of programmes: Allow necessary time and resources to meaningfully engage end-users of climate services, understand different needs and ensure climate services are tailored accordingly. 3. Connect project initiatives to NMHS strategies and national plans: Start with what exists within the NMHS and work closely with them when designing new projects. Extend this to involve regional climate centres. 4. Start discussions about sustainability of interventions early in projects and ensure all relevant stakeholders are involved - clarify the roles and responsibilities of different actors. 5. Invest in dedicated M&E support at both programme and project level to ensure results can be fully realised and robust evidence of what works is collated. End user engagement in the co-creation and implementation of MEL processes should also guide the way forward.	*Stakeholder inclusion. Governance. Impact.* Prioritising engagement with users of climate services (WP1) in the co-design, and tailor services to their needs (WP2-3-4-5). Consider the sustainability of interventions early on and evaluate the services being developed (WP6).
2. Follow a co-production approach to address the barriers to gender equity and inclusion 1. Move beyond simply 'integrating' gender and social inclusion, to make it a core objective of effective climate services uptake. This requires first preparing a robust programme-level Gender and Inclusion Action Plan, and then supporting projects in designing and implementing their own. Gender and context analyses must happen before programmes and projects are designed.	*Gender Equity. Stakeholder Inclusion. Impact.* Gender inclusion is embedded within the project approach, with impact #5 highlighting its predominance since the project inception phase. Applying the RRI gender equality principle implies the uptake of a systematic and integrated approach that permeates the entire project, in all

2. Improving understanding of factors that reinforce inequality of different groups in programme and project design is also key, with programme and project Theories of Change to have pathways systematically designed in to address gender and social inclusion, that link to logframes. 3. Champion gender equality & social diversity at institutional level first: learn from local level best practices (e.g. supporting childcare so that mothers can attend journalist trainings, working with civil society organisations who promote social inclusion). 4. Far broader stakeholder participation at National Climate Outlook Forums (NCOFs) can be one vehicle for supporting inclusion (which requires funding to enable).	of his tasks, responsibilities and impacts. Socio-economic impact assessment foreseen as impact management to help influence the decisions made rather than an evaluation at the end of the project.
3. Build and sustain capacity across all levels of project delivery 1. National Met Services require a range of sustained support which should be built into project design, covering: technical capacities to improve the quality of products, communication skills such as simplifying climate information and engaging stakeholders in co-production, project management skills and pursuing future funding opportunities. 2. Support project intermediaries with training and tools to understand climate services and communication skills to help them reach end-users with information tailored to local needs. 3. At all levels: Draw experiences from other programmes in linking science to socio-economic activities (examples in the WISER Co-production manual and ICPAC Guide) or in implementing inclusive projects. 4. Build upon institutional / partnership knowledge: Recognise and strengthen individual / organisational roles, skills and (sector specific) knowledge but also establish clear roles and responsibilities to implement co-production approaches	*Open Access. Science & Education. Public engagement. Stakeholder Inclusion.* Focus Africa's impact #2 and #4 speak to the fundamental objectives of building capacity and connected communities. WP7 focuses on building capacity and the WISER recommendations provides insights into some of the observed needs in previous projects. Project partners are also encouraged to build on existing resources to co-produce the climate services with the users (WISER Co-production manual and ICPAC Guide).
4. Enhance synergies between projects to help replicability and uptake of climate services 1. Invest in relationship-building between projects (more engagement internally within programmes) by allocating resources to engage with other projects from the start.	*Public Engagement. Open Access. Science & Education. Impact.* From the beginning of the project, Focus Africa has been working hand in hand with Sister Projects Down2Earth and Confer, with their project coordinators part of the

2. Identify and support regional and national focal points (potentially within NHMSs) to create synergies when working with similar stakeholders, with additional support provided by Fund Management. 3. Programme learning and sharing mechanisms should be budgeted at the programme and project level and annual events should be created to enable a learning and sharing environment across projects and into programme. 4. Facilitate adaptive learning between projects and with other programmes: allow Fund Manager or dedicated Knowledge Manager to support projects to evolve.	Advisory Board and opportunities being sought to foster synergies between the projects. Stakeholder engagement workshops have been built into the proposal to serve as the project 'clock' timed throughout its duration and WP7 is focused on capacity building. Specific mechanisms should be described to foster the sustainability of the knowledge sharing and partnership mechanisms and WP6 proposes to integrate the description the various measures taken foster their integration within the project lifetime and beyond. The recommendation on the implementation of '**National Focal Points**' has not yet been embedded and should be considered.
5. Facilitate stakeholder dialogue and iterative climate service processes that enable and address feedback 1. Strengthen joint and effective engagement/dialogue/ communication/ feedback for all partners and end users. Joint collaboration with intermediaries at all levels creates more awareness, uptake of climate information, generate feedback of use and performance and translation of the information to different languages. 2. Project reporting should be a useful tool for projects and the programme and should not distract from project implementation (e.g. disproportionate or unsupported requests for reporting information). 3. Improvement in climate services delivery via user feedback loops such as these will ultimately make WCIS more sustainable. 4. However, it requires dedicated human resource in NMHS to ensure this happens: appropriate roles and	*Public Engagement. Stakeholder Inclusion.* Engagement and communication activities are facilitated within WP1. Check whether translation services are embedded within WP7 and/or WP1 budgets. Project reporting is part of the standard H2020 procedures to monitor the progress of funded projects (not RRI related). However, project evaluation is proposed to integrate impact and RRI considerations to follow a holistic framework for self-assessment and improvement. The same approach / philosophy is at the core of the socio-economic impact assessment of the CSs as part of WP6. Resources are

responsibilities (people with stakeholder engagement, adaptive management in their job descriptions).	therefore planned within the budget to carry out these activities.
6. Sustainability 1. Gather the evidence to demonstrate the socio-economic benefits of co-produced weather and climate services and present it in a compelling way to decision-makers with budgetary authority. 2. The co-production of WCIS pays off. Even so, WISER projects identified there is room for improvement and in future initiatives, climate service providers should include even more stakeholders, with NHMSs undertaking regular stakeholder engagement in product development. 3. Secure senior management and political buy-in for sustained delivery of climate services - as 'champions' for embedding co-production in national policies and budgets. 4. Reconsider funding cycles and implementation phases to reflect realistic timeframes for new climate services development and sustainable outcomes: a sustainability fund could also be set aside by donors for projects or processes that demonstrate impact to continue while pursuing a more robust transition. 5. Donors have a role to play in the investment of NHMSs through e.g. systematic investment techniques such as matched national government funding.	*Impact. Stakeholder Inclusion. Public Engagement.* The socio-economic impact of the CS is being assessed as part of WP6. The sustainability of the CS in terms of their market uptake, suitable business models, ability to be financed and replicated will also be analysed as part of WP6. Efforts are being placed to improve stakeholder engagement which is particularly challenging in the context of the sanitary crisis. Face to face interactions would significantly improve the quality of the exchanges, the co-design and co-evaluation, subsequently. Impact #1 refers to 'better policy making for climate adaptation in project and other countries', a long term objective of Focus Africa. Therefore, as recommended by WISER, **champions** should be identified to embed co-production in national policies and maximise the long term impact of the project.

8.2 Annex 2: A guide for completing the FOCUS AFRICA RRI Action List

Purpose of this document

Following the first stakeholder workshop held on December 1st which focused on learning and applying the principles of Responsible Research & Innovation facilitated by LGI, this document was drafted to ensure a better understanding of the RRI Action List Murals to be completed by the FOCUS Africa project partners. Indeed, as part of Task 1.5, LGI seeks to gather information on the structuring, organisation and content of the RRI actions to be implemented throughout the project. In order to do so, we ask all partners to complete the **Mural RRI Action Lists** thanks to the links provided in the table below. The RRI workshop mural links are also provided for reference. The deadline to complete the RRI matrices is **February 28th, 2021**.

Mural Links

Sector	Food security	Water and Infrastructure	Energy
RRI Action List Mural links (to complete)	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1607932505343/c7156000e8cf67d018dca80c8d598d0212c41235*	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1609960333049/5d2fec35e045b8ce60210351bf3057b508605eda*	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1609961320855/747346819be9856d743d533e6adf081fcb76b6a1*
RRI Workshop Mural links (for reference only)	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1604913045733/d753bb4e5fbd0d361ea9254cc3dd3ae4acf802c3*	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1605889456740/2d0a4826bbea848694bdf31bed2b6d81f468a17f*	*https://app.mural.co/t/lgimural1790/m/lgimural1790/1605892252077/62c79e3f5f4b7baaa82876c0a68df4d041b05d24?sender=yasminadkhissi4331*

Structure of the Mural

All partners will receive the Mural links corresponding to the Case Study sector they are working on, as per during the first stakeholder workshop. That is:

- Food Security;
- Water & Infrastructure;
- Energy.

1. *Recap of first stakeholder workshop*

On the top section of your Mural, you will see the recap of some of the key work carried out during the first stakeholder workshop. Namely, the RRI actions, the project timeline from day 2 and the workplan from day 1.

These sections are here for you to remember previous work done and develop on this basis the Action List Matrix in the section below.

2. *Action List Matrix*

The Action List Matrix is the section of the Mural you have to complete before **February 28th, 2021.**

The objective of this activity is for you to think about the work plan of your case study, through the framework of the RRI principles we have presented during the first stakeholder workshop. What actions will I design, develop and implement in order to meet these principles? To correlate these actions with work you are already planning as part of the project, we have used the Work Packages as the horizontal axis of the matrix. You should list the actions corresponding to every RRI dimension that appears on the left column or vertical axis, and try to match these actions to the Work Package they belong to.

N.B. Please make sure to put your initials and organisation name on every post-it so that we know who wrote what.

For a reminder on the meaning of the RRI dimensions listed, see below:

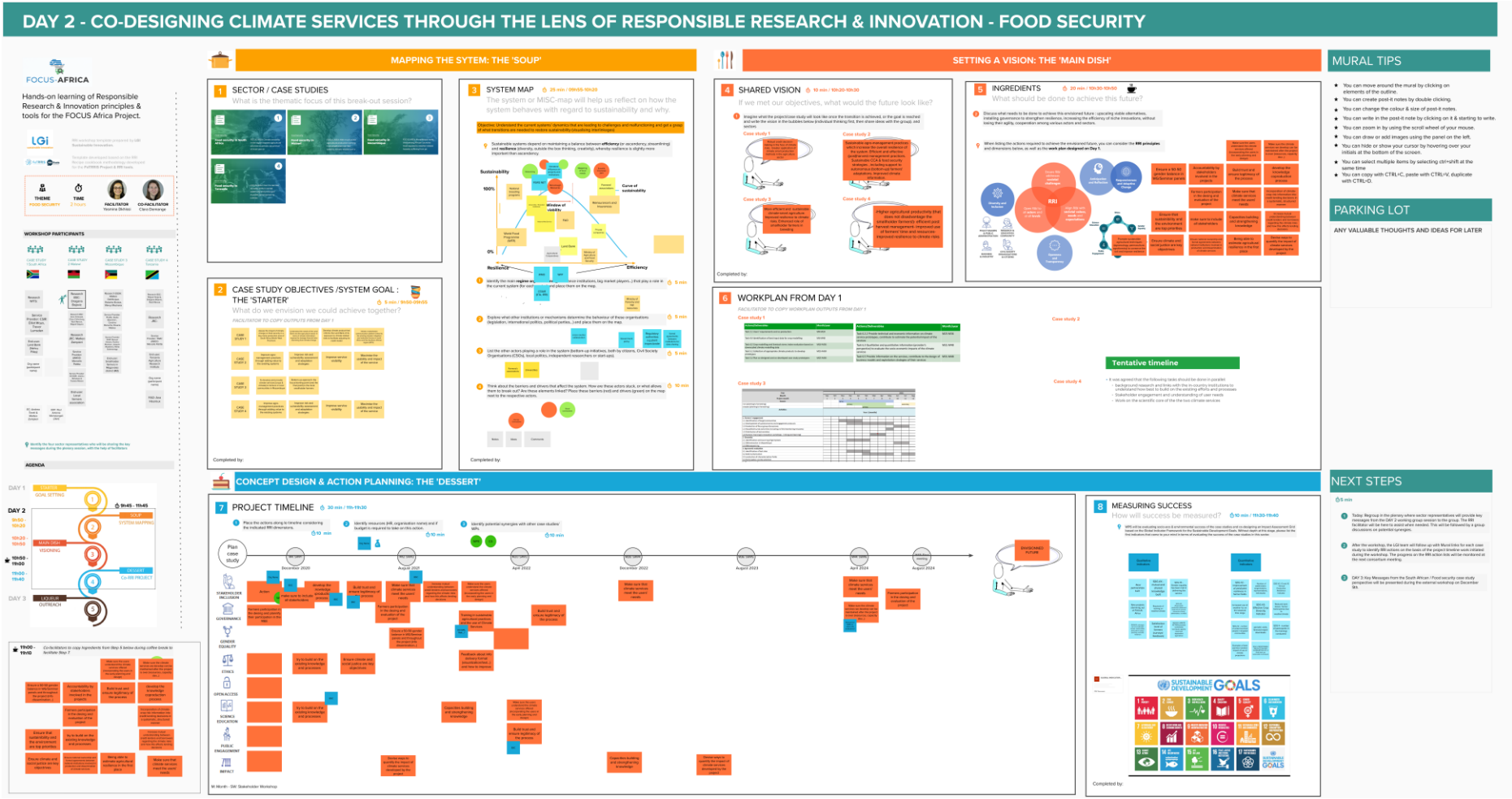
3. Next steps

These RRI Action List matrices will be used to identify the RRI actions and monitor our collective progress throughout the project and during consortium meetings.

Deliverable D1.8 *'Report on the introductory session on responsible research and innovation*' due in M12, August 2021, will be drafted combining work developed during the first stakeholder workshop, the list of targeted actions for RRI implementation and progress monitored to date.

8.3 Annex 3: RRI Workshop Murals

8.3.1 Food Security Workshop Mural



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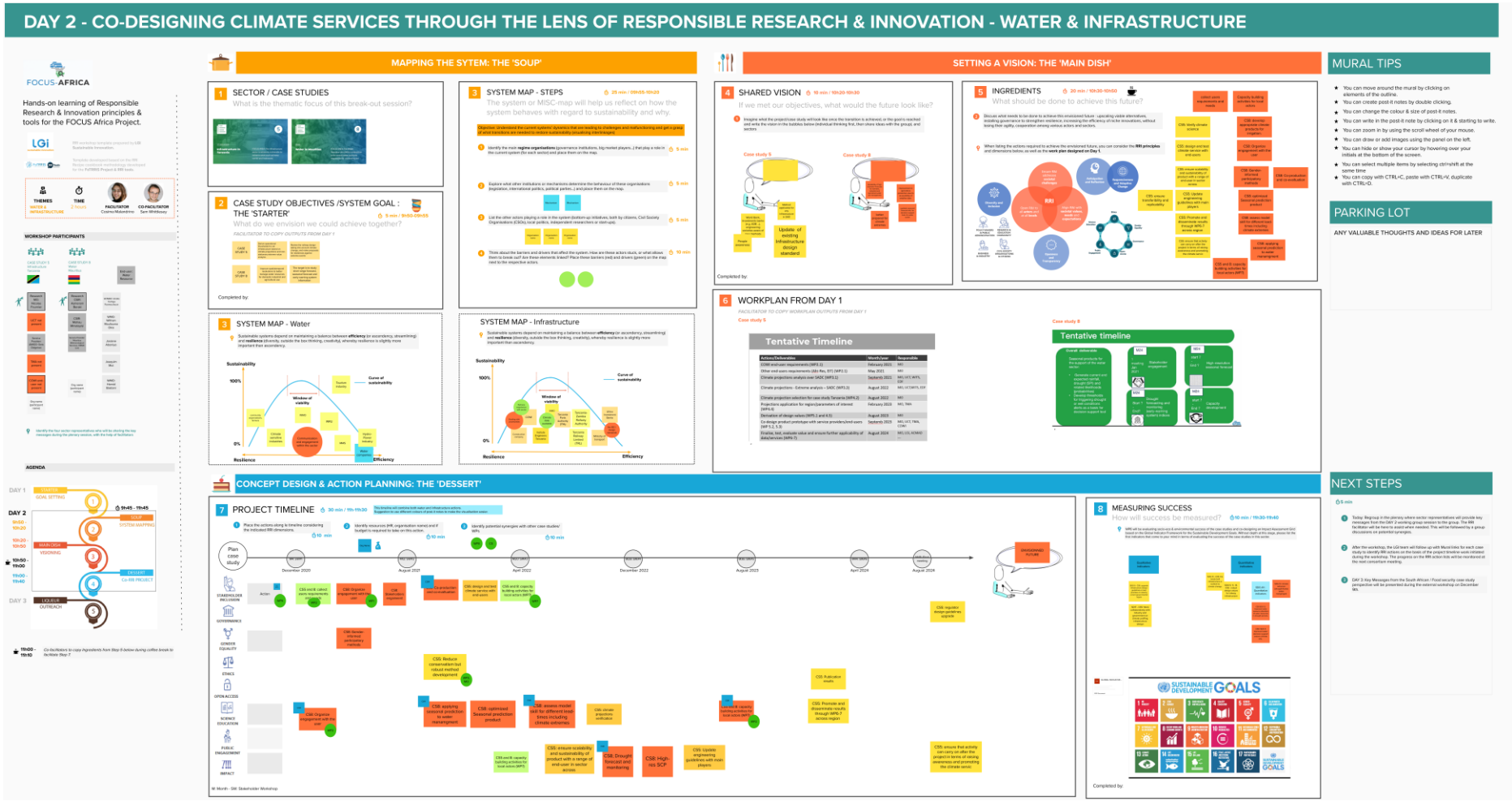
8.3.2 Water & Infrastructure Workshop Mural



8.3.3 Energy Workshop Mural