



# From Fragility to Resilience in Central and West Asia and North Africa (F2R-CWANA)

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## Summary Table

Initiative name	From Fragility to Resilience in Central and West Asia and North Africa (F2R-CWANA)
Primary Action Area	Resilient Agrifood Systems
Geographic scope	1-Central and West Asia and North Africa (CWANA): EG-Egypt, LB-Lebanon, MA-Morocco, UZ-Uzbekistan, SU-Sudan.
Budget	USD 30,000,000

## 1. General Information

Initiative name: From Fragility to Resilience in Central and West Asia and North Africa (F2R-CWANA)

Primary CGIAR Action Area: Resilient Agrifood Systems

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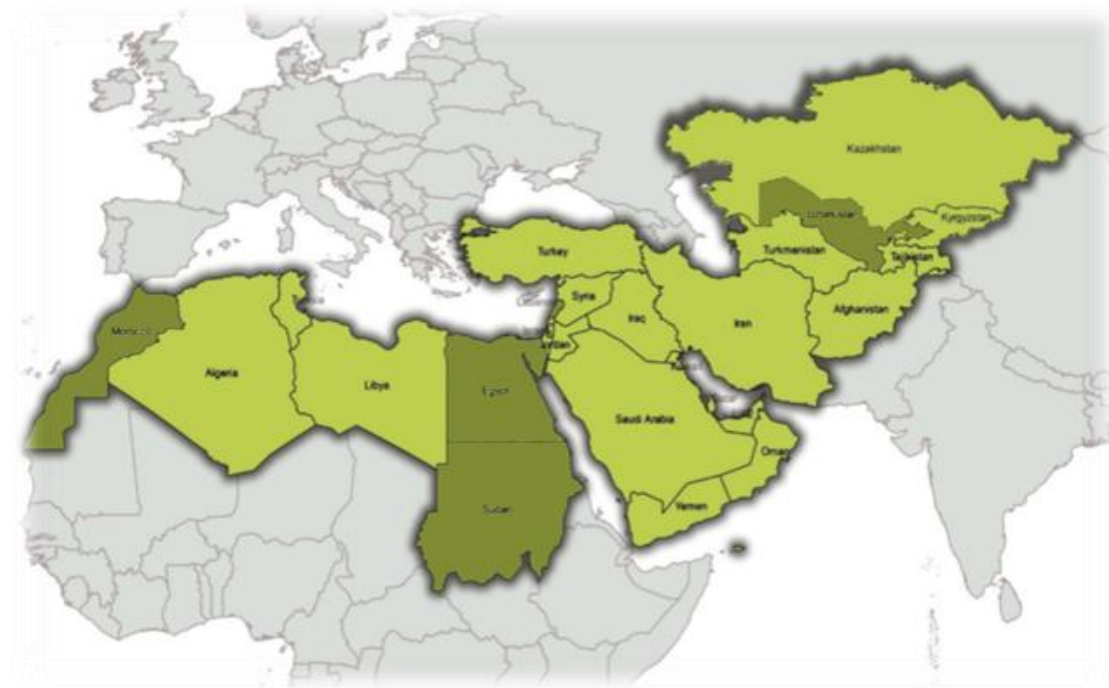
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## 2. Context

### 2.1 Challenge statement

The CWANA region covers a vast swathe of land across Central Asia<sup>i</sup>, West Asia<sup>ii</sup>, and North Africa<sup>iii</sup> and contains a great diversity of human cultures and agroecological systems. What unifies this area is a relative semi-arid and aridness that is only going to become more extreme with ongoing climate change<sup>1,2</sup>. The region is expected to experience an increase in the severity and frequency of hot temperatures, agricultural and ecological droughts<sup>iv</sup>, precipitation droughts, floods, climate variability, and climate change compound events with significant consequences for society and the environment<sup>v,3,4,5</sup>.



**Figure 1.** Map of the countries in the CWANA region. The countries the F2R-CWANA Regional Integrated Initiative will focus on are marked in dark green (Morocco, Egypt, Sudan, Lebanon, Uzbekistan).

Despite the inherent constraints in the CWANA region of a lack of productive agricultural land (in the MENA<sup>vi</sup> region: 33% for crops and pastures, 5% for crops alone) and severe water scarcity and unsustainable surface and groundwater abstraction (for use in agriculture)<sup>6</sup>, the predominantly rainfed agrifood systems (70%)<sup>1</sup> are frequently the largest employers of the populace and of women<sup>7</sup>, and significantly contribute to national GDP and local food security<sup>1,8</sup>; in a region heavily dependent upon food

<sup>i</sup> [Map of Central Asia and Caucasus region - Nations Online Project](#)

<sup>ii</sup> [Map of Countries in Western Asia and the Middle East - Nations Online Project](#)

<sup>iii</sup> [Map of Countries in Northern Africa - Nations Online Project](#)

<sup>iv</sup> A period with abnormal soil moisture deficit caused by shortages of precipitation and/or excess land evapotranspiration.

<sup>v</sup> Caused by the interaction of multiple physical processes across multiple spatial and temporal scales.

<sup>vi</sup> Middle East and North Africa (MENA).

imports<sup>vii,viii</sup>. The CWANA regional agrifood systems are however incredibly vulnerable to overuse of the limited natural resources, the biophysical effects of present and future climate change, and their interplay with societal pressures, e.g. gender inequalities<sup>9,10,11</sup>, youth unemployment<sup>ix,x</sup>, demographic shifts<sup>12,13</sup>, predominance of small, non-specialised smallholdings<sup>6</sup>; institutional<sup>6, 14, 15, 16, 17</sup>; and economic pressures<sup>18,19,20,21,22</sup>. The consequences of experiencing multiple compounding events in places that do not have resilient systems in place to cope with them can be devastating. For instance, the Syrian uprising in 2011 occurred after the most severe drought on record (between 2007-2010) and the prolonged unsustainable use of freshwater resources for irrigation caused widespread crop failure and mass migration from rural to urban centres, and civil unrest<sup>1,23,24</sup>.

**Table 1.** *Fragile States Index (FSI) score greater than 60 for countries in CWANA, 2021.*

FSI category	FSI score	Country
Warning	61.2	Kazakstan
	66.7	Bahrain
	68.2	Turkmenistan
	69.2	Tunisia
	69.7	Saudi Arabia
Elevated warning	<b>71.5</b>	<b>Morocco</b>
	<b>72.0</b>	<b>Uzbekistan</b>
	72.6	Georgia
	75.1	Tajikistan
	75.1	Azerbaijan
	76.4	Kyrgyzstan
	76.8	Jordan
	79.7	Turkey
High warning	84.5	Iran
	<b>85.0</b>	<b>Egypt</b>
	86.0	Palestine
	<b>89.0</b>	<b>Lebanon</b>
Alert	96.2	Iraq
	97.0	Libya
High alert	102.1	Afghanistan
	<b>105.2</b>	<b>Sudan</b>
Very high alert	<b>110.7</b>	<b>Syria</b>
	111.7	Yemen

Many of the countries in CWANA are considered to be fragile and conflicted affected<sup>xi</sup>, with Fragile States Index (FSI) scores<sup>xii</sup> greater than 60 that fall into the ‘warning’ and ‘alert’ categories (Table 1)<sup>24</sup>. As elucidated by the FSI authors and others, the causal path(s) from climate change impacts, environmental degradation, and water scarcity to fragility and conflict may be: that a loss of food-, water-, and livelihood-security leads to an increase in negative coping mechanisms, psychosocial distress, and forced migration; which puts additional pressure on local economies and resources that receive the influx of migrants (or refugees); and where a lack of shared institutions to resolve conflicts arising from this situation results in social tension; which could be exploited by certain groups for political and economic gain, especially where government responses are non-existent, harmful, or ineffective; until a point is reached where social unrest and conflict break out<sup>24,25,26,27,28,29,30,xiii</sup>.

vii [MENA Has a Food Security Problem, But There Are Ways to Address It \(worldbank.org\)](https://www.worldbank.org/en/news/press-release/2021/04/28/mena-has-a-food-security-problem-but-there-are-ways-to-address-it)

viii [In Middle East, panic buying spreads as Russian invasion of Ukraine sparks fear over food and fuel - The Washington Post](https://www.washingtonpost.com/middle-east/panic-buying-spreads-as-russian-invasion-of-ukraine-sparks-fear-over-food-and-fuel-the-middle-east/2022/02/24/)

ix [Youth unemployment in North Africa: A short overview – IFAIR](https://www.ifair.org/en/youth-unemployment-in-north-africa-a-short-overview/)

x [The Problem of Unemployment in the Middle East and North Africa Explained in Three Charts \(worldbank.org\)](https://www.worldbank.org/en/news/press-release/2021/04/28/the-problem-of-unemployment-in-the-middle-east-and-north-africa-explained-in-three-charts)

xi [Order to the Chaos: Understanding and addressing the intersecting conflicts in the MENA region: Department for Middle East and North Africa \(fes.de\)](https://www.fes.de/en/middle-east-and-north-africa/order-to-the-chaos-understanding-and-addressing-the-intersecting-conflicts-in-the-mena-region)

xii [Fragile States Index | The Fund for Peace](https://www.fundforpeace.org/en/fragile-states-index/)

xiii [Climate change as a trigger of border river conflicts in Central Asia \(international-alert.org\)](https://www.international-alert.org/en/climate-change-as-a-trigger-of-border-river-conflicts-in-central-asia)

Poor governance and an ineffective institutional environment create a situation whereby the root causes of fragility are not adequately addressed, leaving communities continually vulnerable to worsening threats and exacerbating social tensions<sup>24</sup>.

## 2.2 Measurable three-year end of initiative outcomes

**EoIO 1** Government, civil society, private sector and INGOs jointly develop strategies and policies to create more efficient, inclusive, and resilient national agrifood systems.

**EoIO 2** Government supports and facilitates the use of Best Bet genetic innovations developed for CWANA.

**EoIO 3** Government supports and facilitates the on-farm and ex-situ conservation of agrobiodiversity.

**EoIO 4** Government, civil society and private sector scale up bundled solutions to decompose yield gaps.

**EoIO 5** Government, civil society and private sector put into practice the integrated management of food, land, water, and energy systems.

**EoIO 6** Government, civil society and private sector scale up innovations and digital tools for food value chain climate risk management.

## 2.3 Learning from prior evaluations and impact assessments [Finished? RC only accepted changes and fixed references

The F2R-CWANA Regional Integrated Initiative has been built upon the strong foundation and learnings of numerous CGIAR Research Programs (CRPs) and Platforms such as: Climate Change, Agriculture and Food Security (CCAFS)<sup>31</sup>, Dryland Systems<sup>32</sup>, Genebanks Platform (GENEBANK)<sup>33</sup>, Gender Platform (Gennovate)<sup>34</sup>, Grain Legumes and Dryland Cereals (GLDC)<sup>35</sup>, Policies, Institutions, and Markets (PIM)<sup>36</sup>, Roots, Tubers and Bananas (RTB)<sup>37</sup>, WHEAT<sup>38</sup>, and Water, Land and Ecosystems (WLE)<sup>39</sup>.

Through CRP-PIM<sup>36</sup> involvement we continue to enhance the capacity of researchers and organisations with a capacity development programme while simultaneously working on policy outcomes and innovations (*what*) and key factors that enable or constrain results (*how*). The Initiative acts as a common space to effectively co-design technologies, adequately validate them in bundles of solutions (from this and other Initiatives), identify and mitigate for their trade-offs and ultimately demonstrate back to policy makers the important elements of the initiative. In particular, the use of Innovation Platforms in each of the primary target countries will define a multi-stakeholder forum (National Alliance of Stakeholder) to discuss, assess, and prioritize technologies and enabling policies.

The Initiative builds on Gennovate<sup>34</sup> research findings and approaches that address the question of how gender norms and agency influence men, women, and youth to adopt innovations in agriculture and natural resource management (NRM). Its main contribution has been to make explicit the role of gender norms in enabling adoption of innovations (social and technical) and thereby the crucial role of transforming harmful norms<sup>34</sup> and addressing power inequalities among women and between women and men in rural collectives<sup>40</sup>. Prior research reveals that in addition to enabling women to access and own

land, it is important to strengthen and validate women's roles in agriculture<sup>10,41</sup>. This is critical since women often saw themselves and were seen by others in local communities as helpers rather than farmers<sup>42</sup>, despite their often-significant role in household earnings<sup>41</sup>. Rural collectives are often seen as a route through which these norms can be challenged and resources for women can be accessed<sup>43</sup>.

From Dryland Systems<sup>32</sup> we revisited some of the integrated research sites that can be used as innovation platforms and apply the systems approach and thinking throughout the initiative. From all the systems programs (e.g. <sup>32,35,38,37</sup>) we are capitalizing on CGIAR system science approaches. Overall system research will be implemented along 7 key steps<sup>32</sup>: (1) focus on complex social-ecological systems and livelihood portfolios (farming systems and crop productions are essential parts of them); (2) explicit consideration of trade-offs among multiple expected impact areas (improving productivity, reducing risk, and social, economic and environmental sustainability), targets multiple wins where possible, balances trade-offs where not; (3) attention to interactions between system components with considering externalities and vulnerabilities; (4) broader focus on innovations and investments that respond to interactions between multiple drivers of change across contexts and scales; (5) facilitate scaling up and out; (6) interdisciplinary (not only among science disciplines, but also between scientific and indigenous knowledge) and improving local ownership of development pathways, and (7) engage and empower disadvantaged groups in the research process.

In relation to genetic Innovation, F2R-CWANA builds on previous work from the CRPs, Platforms, and on the recommendations in the CAS synthesis report<sup>44</sup> to ensure that high priority is given to nutrition, health, resilience, and environmental sustainability objectives in research groups focused on genetics.

Analysis of seed systems, varietal adoptions and impacts to identify critical challenges will inform varietal choices, adoption and impacts as well as systemic constraints of delivery from demand side instead of supply driven perspectives<sup>45,46</sup>.

WHEAT, GLDC, RTB, and WLE informed WP3 with a diverse approach to water, land and environment management, positioning cereals, potatoes/sweet potatoes, food and forage legumes, dryland fruit trees and vegetables for farming system diversification, intensification and sustainable production in CWANA.

From WLE, WP4 integrates approaches to water, energy, land and environment identified within the SDGs and wider climate needs. This underpins the need to build a System-wide basis to strengthen transformational agricultural practices to maintain ecosystem services

CCAFS influenced the design of WP5 where we learnt that examining the root causes of challenges, identifying transformative solutions, and including a broader range of levers will help to address questions of political economy, nutrition, pests and diseases, and climate security.

Annex for section 2.3 Learning from prior evaluations and impact assessments [here](#).



## 2.4 Priority-setting

**CWANA situational prioritization:** The major drivers of the situational prioritisation for F2R-CWANA were: the DryArc Initiative (see documents in the Annex); the Two Degree Initiative (2DI)<sup>xiv</sup> and the Grand MENA Challenge<sup>xv</sup>; the “Climate-informed priorities for One CGIAR Regional Integrated Initiatives” report<sup>47</sup>; IPCC 6<sup>th</sup> Assessment Report<sup>3</sup>; and the UNFSS independent dialogues<sup>xvi</sup>.

**Countries:** Critical considerations for country selection included: potential for impact based on the enabling environment (existing national strategies on food and agriculture, land, water, climate change, SDGs, women, youth, and digital adoption); existing CGIAR presence, networks, and Innovation Platforms; biodiversity, agroecology, freshwater sources, and farming system typology present at the national level and the importance and representativeness of this for the region; donor interest; and country needs (income level, challenges present, social issues, fragility/risk-resilience spectrum). Of the initial 12-country long-list, initial operating countries identified as representative of CWANA resulted in: Morocco, Egypt, Sudan, Lebanon and Uzbekistan (see “12 Country Data Gathering” in Annex).

**Crops and other commodities:** CWANA hosts three Vavilovian centers of origin for many species of global importance<sup>48</sup> with wheat-based and mixed-farming systems at the core of its food and nutritional security. Cereals (durum, bread wheat, barley, rice), potatoes/sweet potatoes, food and forage legumes, dryland fruit trees and vegetables are critical for farming system diversification, intensification and sustainable production in CWANA<sup>47</sup>. Other genetic solutions (breeds or fish) will be included if synergies can be found, and the livestock value chain will be included by promoting feed and forage crops. The prioritization of Genetic Innovation crop Product Profiles will be done at the MIPP Initiative<sup>xvii</sup> level, and the selected ones will be presented by MIPP and Accelerated Breeding Initiative<sup>xviii</sup> staff to the CWANA National Alliance of Stakeholders (described further in Work package 1) for a final prioritization based on local preferences and potential synergies with National programs.

**Farming systems:** Eight types of farming systems (Table 2) have been identified in the CWANA region (Figure 2 depicts distribution in the MENA region<sup>49</sup>). The F2R-CWANA Initiative has prioritised the highland, rainfed, and dryland mixed and irrigated farming systems (and to a lesser extent the pastoral and dryland mixed systems) as these areas account for the majority of crop, fruit, vegetable, and livestock production in the region and form the basis of meeting the food, nutrition, and livelihood security needs for millions of households. The Initiative will focus on rain-fed, dryland and highland mixed systems in Morocco and Lebanon, with spill-over into Tunisia, Algeria, Libya, Syria, Iraq, Turkey, Afghanistan; and irrigated systems, predominantly used for wheat production (65%)<sup>6</sup>, in Egypt, Sudan, and Uzbekistan, with spill-over into Tunisia, Syria, and Iraq.

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<sup>xiv</sup> [Two Degree Initiative \(2DI\) \(cgiar.org\)](https://www.cgiar.org/two-degree-initiative/)

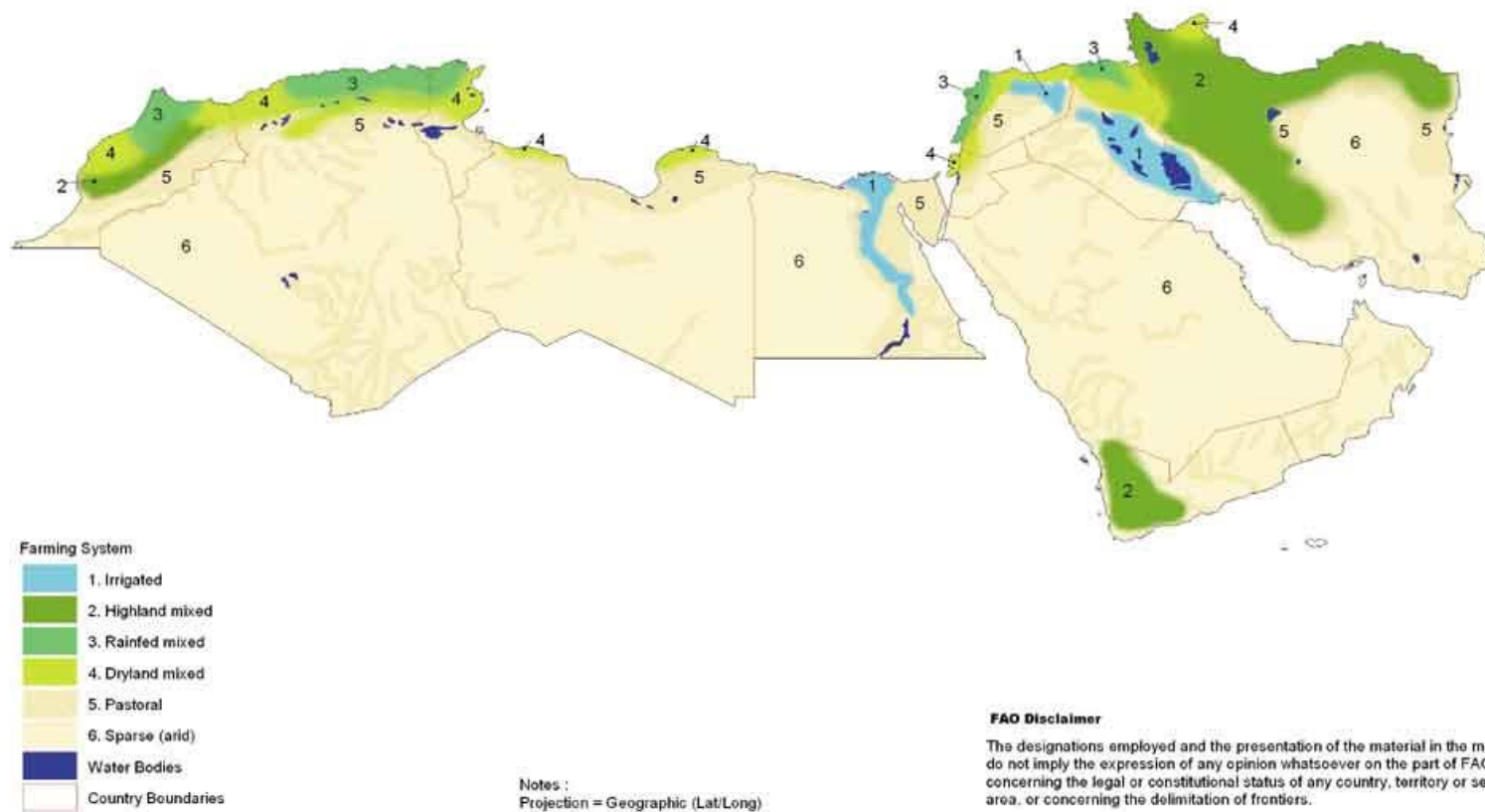
<sup>xv</sup> [The MENA Grand Challenge - working towards climate-smart agri-food systems | ICARDA](#)

<sup>xvi</sup> [UNFSS Independent Dialogue in Egypt:: IWMI Events \(cgiar.org\)](#)

<sup>xvii</sup> [Market Intelligence and Product Profiling - CGIAR](#)

<sup>xviii</sup> [Accelerated Breeding: Meeting Farmers' Needs With Nutritious, Climate-Resilient Crops - CGIAR](#)

## Major Farming Systems Middle East and North Africa Map 1



**Figure 2.** The major farming systems in MENA<sup>49</sup>.

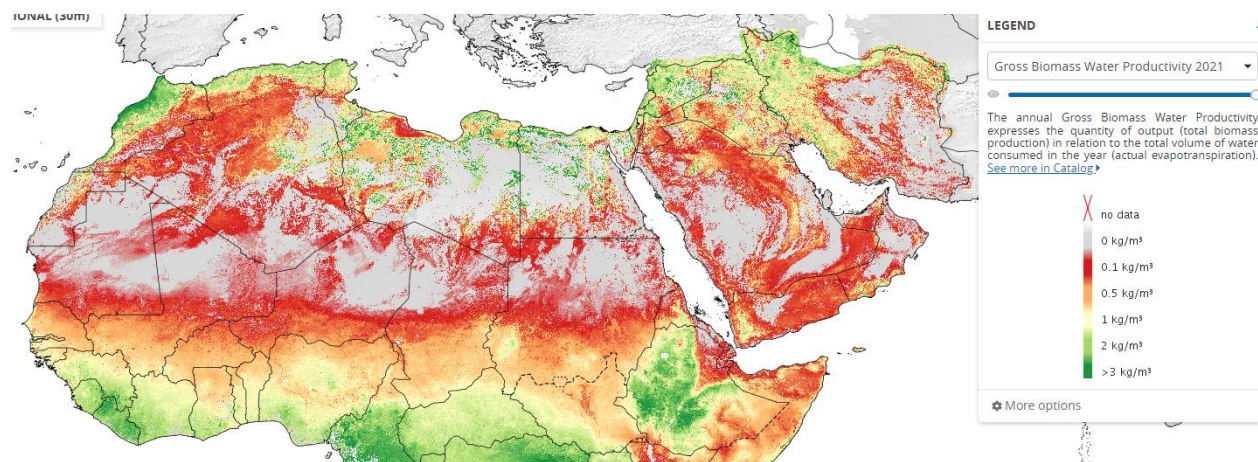
**Table 2.** Characteristics of the eight farming systems identified in the CWANA region.

Farming system	Land area (% of region) <sup>49</sup>	Agricultural population (% of region) <sup>49</sup>	Principal livelihoods <sup>49</sup>	Prevalence of poverty <sup>xix, 49</sup>	Exposure: Expected climate change related events <sup>6</sup>	Sensitivity: Likely impact on farming system <sup>6</sup>
Irrigated	2	17	Fruits, vegetables, cash crops	Moderate	Increased temperatures Reduced supply of surface irrigation water Dwindling of groundwater recharge	More water stress Increased demand for irrigation and water transfer Reduced yields when temperatures are too high Salinisation due to reduced leaching Reduction in cropping intensity
Highland mixed	7	30	Cereals, legumes, sheep, off-farm work	Extensive	Increase in aridity Greater risk of drought Possible lengthening of the growing period Reduced supply of irrigation water	Reduction in yields Reduction in cropping intensity Increased demand for irrigation
Rainfed mixed	2	18	Tree crops, cereals, legumes, off-farm work	Moderate (for small farmers)	Increase in aridity Greater risk of drought Reduced supply of irrigation water	Reduction in yields Reduction in cropping intensity Increased demand for irrigation
Dryland mixed	4	14	Cereals, sheep, off-farm work	Extensive (for small farmers)	Increase in aridity Greater risk of drought Reduced supply of irrigation water	A system very vulnerable to declining rainfall Some lands may revert to rangeland Increased demand for irrigation
Pastoral	23	9	Sheep, goats, barley, off-farm work	Extensive (for small herders)	Increase in aridity Greater risk of drought Reduced water for livestock and fodder	A very vulnerable system where desertification may reduce carrying capacity significantly Non-farm activities, exit from farming, migration
Sparse (arid)	62	5	Camels, sheep, off-farm work	Limited	xx	xx
Coastal artisanal fishing	1	1	Fishing, off-farm work	Moderate	xx	xx
Urban based	<1	6	Horticulture, poultry, off-farm work	Limited	xx	xx

<sup>xix</sup> Prevalence of poverty refers to the number in poverty, not the depth of poverty, and is a relative assessment for this region.

<sup>xx</sup> These farming system types are not included in the OECD/FAO report (2018).

**Water productivity:** The greater CWANA region contains the most water-scarce<sup>xxi</sup> region (MENA) in the world, where 60% of people presently live in a high or extremely high water-stressed area and where freshwater availability would further decrease by 15-45% given a 2°C rise in global annual average temperatures<sup>5</sup>. It is therefore imperative that the F2R-CWANA Initiative address water issues, and especially water as it relates to agrifood systems through the measurement of Gross Biomass Water Productivity (GBWP)<sup>xxii</sup> (Figure 3).



**Figure 3.** MENA region Gross Biomass Water Productivity 2021 (taken from the FAO WaPor<sup>xxiii</sup>).

**Innovations supporting change:** From an initial list of 58 innovations, including 33 “golden eggs” originating from CRPs and other work, nine innovations were prioritised for the Scaling Readiness Plan, based on their maturity and perceived likelihood of success to support agrifood systems transformation in CWANA. Regular engagement within and between work-package teams and other Initiatives was undertaken to identify and align with research priorities and ensure a complementary and synergistic approach of incorporation.

**Fragility risk-mitigation:** The countries that F2R-CWANA will prioritise working in fall into the FSI “elevated warning”, “high warning”, and “high alert” categories (Table 1)<sup>24</sup>, therefore, fragility-risk management is incorporated throughout the general operation and management of F2R-CWANA to enable us to effectively work in the region, given the reality of the challenges.

Annex for section 2.4 Priority setting [here](#).

<sup>xxi</sup> Water-scarce defined as countries with less than 1,000 cubic metres of renewable fresh water per person per year.

<sup>xxii</sup> GBWP defined as: Total Biomass Production (TBP) in kg/ha / Actual Evapotranspiration and Interception (ETIa) in m<sup>3</sup>/ha cumulated during the course of the growing season.

<sup>xxiii</sup> FAO Water Productivity - the FAO portal to monitor Water Productivity through Open access of Remotely sensed derived data (WAPOR): [https://wapor.apps.fao.org/home/WAPOR\\_2/1](https://wapor.apps.fao.org/home/WAPOR_2/1)

## 2.5 Comparative advantage

For F2R-CWANA, the CGIAR brings together unrivalled, system-wide expertise in undertaking research-for-development to provide innovative, science-based solutions for communities across the non-tropical dry areas that advances scientific knowledge, shapes practices, and informs policy. The CGIAR - through ICARDA<sup>xxiv</sup> being headquartered in Syria since its establishment in 1975 (temporarily headquartered in Lebanon since 2012) and with centres IWMI<sup>xxv</sup>, IFPRI<sup>xxvi</sup>, CIP<sup>xxvii</sup>, WorldFish<sup>xxviii</sup>, CIMMYT<sup>xxix</sup>, and ABC<sup>xxx</sup> - has offices in Morocco, Tunisia, Egypt, Sudan, Jordan, Lebanon, Palestine, Syria, Turkey, United Arab Emirates, Georgia, Tajikistan, Uzbekistan, and Afghanistan; and further operational experience in Algeria, Tunisia, Libya, Eritrea, Palestine, Iran, Iraq, Kuwait, Bahrain, Saudi Arabia, Qatar, Oman, Yemen, Armenia, Azerbaijan, Turkmenistan, Kazakhstan, Tajikistan, and Kyrgyzstan. Some centres such as IRRI<sup>xxxi</sup> have no permanent presence in the region but do have projects and other activities (in countries already listed).

CGIAR has significant infrastructure and technical equipment in CWANA, with the ICARDA genebanks that contain around 143,000 samples of ICARDA mandate crops barley, chickpea, faba bean, forage legumes, grasspea, lentil, wheat (bread and durum types) and other crucial agrobiodiversity landraces and species from the major Vavilovian centres of plant diversity; and the ICARDA research stations in Morocco and Lebanon that contain over 100 ha of fields for experimentation and demonstration, cutting-edge biotechnology, breeding, and phenotyping laboratories, and seed system infrastructure. CIP has a genebank containing around 150 varieties of potato and sweetpotato, in-vitro laboratories and greenhouses, and a series of experimental research stations across Georgia. WorldFish has a Research and Training Facility in Egypt that is around 100 ha and includes a number of experimental ponds and tanks, and laboratories.

CGIAR has significant relationships, partnerships, and networks through the countries, regions and globally, across the spectrum of demand, innovation and scaling partners, with country governments and ministries; the national agricultural research and innovation systems (NARISs); the UN and specialised agencies of FAO, IFAD, and World Bank Group; the World Food Programme (WFP); governmental organisations and non-governmental organisations (NGOs); universities and advanced research institutes (ARIs); private sector; civil-society organisations, and beneficiary groups including farmers, women, and youth.

For information on previous CGIAR and bilateral projects, publications, and international public goods developed from these, please see the annex for section 2.5 Comparative advantage [here](#).

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<sup>xxiv</sup> <https://www.icarda.org/>

<sup>xxv</sup> <https://www.iwmi.cgiar.org/>

<sup>xxvi</sup> <https://www.ifpri.org/>

<sup>xxvii</sup> <https://cipotato.org/cgiar/>

<sup>xxviii</sup> <https://www.worldfishcenter.org/>

<sup>xxix</sup> <https://www.cimmyt.org/>

<sup>xxx</sup> <https://alliancebioiversityciat.org/>

<sup>xxxi</sup> <https://www.irri.org/>

## 2.6 Participatory design process

The F2R-CWANA Initiative has been developed through a participatory process, recognising that the unique challenges and opportunities presented in CWANA will be most effectively addressed with the intellectual, technical, human, and social capital that comes with working in partnership with partners, stakeholders, and beneficiaries<sup>xxxii</sup>. A core Initiative Development Team (IDT), led by colleagues from ICARDA and IWMI and other colleagues from across CGIAR Centers, donors, and the private sector was formed to guide and manage the overall development of F2R-CWANA. An extended IDT of key scientists and professionals across eight CGIAR Centers, INGOs and policymakers worked with the core IDT to develop the specific detail of the proposal.

Over 30 subject matter experts engaged as reviewers at various stages to ensure the robustness of the proposed methodology. Conversations with other IDTs were undertaken to ensure complementarity, augment expected outcomes and impact, and identify core areas to work together to achieve a Regional Integrated Initiative that works well with the Global Initiatives, and an overall coherent One CGIAR Initiative portfolio.

Consultations with key regional and national partners were conducted in multiple ways. The Regional NARS Consultation (July 2021) led by Mr Aly Abousabaa (CWANA Regional Director) sought to hear from partners and stakeholders directly their perception of the regional challenges, needs, and how to best address these. Twenty-two countries were represented from the region, with 120 individuals attending. A Regional Online Survey was shared with 400 key stakeholders (government, private sector, donors, SMEs, research centers, academia, technology and innovation centers) in 5 languages (English, French, Arabic, Russian and Georgian) across 12 countries<sup>xxxiii</sup>. Seventy-four respondents from these 12 countries validated the challenges they face, shared existing national policies/strategies and information on existing in-country capacity, and information on donor priorities and future plans/strategies (see Annex for further details). This was complemented by ongoing interactions with 10 donors via email and bilateral follow-up to explore and ensure complementarity of priorities. These participatory efforts helped to lay the foundation for strong and effective partnerships that are ready to be re-engaged at the inception of F2R-CWANA activities.

Online country consultation and information sessions were done in Egypt, Morocco, Lebanon, and Uzbekistan<sup>xxxiv</sup>, with more than 200 stakeholders participating, to again confirm that the F2R-CWANA Initiative proposal was meeting country needs through the proposed work packages and innovations, and to make amendments to the proposal as necessary to better reflect the national perspectives based on

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<sup>xxxii</sup> Roles defined as: Partners having a formal governance role; Stakeholders being consulted, engaged, and/or participate in project activities as they have an interest or concern in the project and its impact; Beneficiaries being the people or group who experience the beneficial outcomes of the project.

<sup>xxxiii</sup> The twelve countries were: Afghanistan, Egypt, Georgia, Iraq, Jordan, Lebanon, Morocco, Sudan, Syria, Turkey, Uzbekistan, and Yemen.

<sup>xxxiv</sup> Online country consultations were undertaken for four of the five countries (Morocco, Egypt, Lebanon, and Uzbekistan) but not for Sudan due to recent instability that included the cutting of internet services.



feedback Numerous partners and stakeholders expressed their support for F2R-CWANA with letter of support (see Annex). The relationships formed and contact lists gained during these interactions will guide the Initiative start-up activities and ensure the formation of strong partnerships.

It was not possible to do direct consultations with individuals or groups of the expected beneficiaries such as rural women, youth, smallholder farmers, etc. in the anticipated sites of implementation, given the constraints of time and other resources in the proposal development process, and in the context of the ongoing Covid-19 pandemic. We will become more targeted in our consultation processes over time as the Initiative is implemented on the ground.

Annex for section 2.6 Participatory design process [here](#).

## 2.7 Projection of benefits

The projections below transparently estimate reasonable orders of magnitude for impacts which could arise as a result of the impact pathways set out in the Initiative's Theories of Change. F2R-CWANA *contributes* to these impact pathways, along with other partners and stakeholders.

For each impact area, projections consider breadth (numbers reached), depth (expected intensity of effect per unit) and probability (a qualitative judgement reflecting the overall degree of certainty or uncertainty that the impact pathway will lead to the projected order of magnitude of impact).

Projections will be updated during delivery to help inform iterative, evidence-driven, dynamic management by Initiatives as they maximize their potential contribution to impact. Projected benefits are not delivery targets, as impact lies beyond CGIAR's sphere of control or influence.

Breadth	Depth	Probability
<b>Nutrition, health &amp; food security:</b> 3,500,000 people benefitting from relevant CGIAR innovations	Substantial <sup>xxxv</sup>	High <sup>xxxvi</sup>
<b>Poverty reduction, livelihoods &amp; jobs:</b> 3,500,000 poor people benefitting from relevant CGIAR innovations	Substantial <sup>xxxv</sup>	Medium <sup>xxxvii</sup>
<b>Gender equality, youth &amp; social inclusion:</b> 1,600,000 women benefiting from relevant CGIAR innovations 1,200,000 youth benefiting from relevant CGIAR innovations	Substantial <sup>xxxviii</sup> Substantial <sup>xxxv</sup>	Medium <sup>xxxvii</sup> Medium <sup>xxxvii</sup>

<sup>xxxv</sup> 50% permanent impact increase on income.

<sup>xxxvi</sup> 50%-80% probability of achieving these impacts by 2030.

<sup>xxxvii</sup> 30%-50% probability of achieving these impacts by 2030.

<sup>xxxviii</sup> The different needs of men and women are identified and differentially met (but the underlying process by which these differing needs are generated is not affected).

<b>Climate adaptation &amp; mitigation:</b>		
2,400,000 people benefiting from climate-adapted innovations	Substantial <sup>xxxv</sup>	Medium <sup>xxxvii</sup>
<b>Environmental health &amp; biodiversity:</b>		
5,300,000 ha under improved management	Substantial <sup>xxxix</sup>	Medium <sup>xxxvii</sup>
5.75 km <sup>3</sup> consumptive water use	Substantial <sup>xl</sup>	High <sup>xxxvi</sup>
1,500 plant genetic accessions available and safely duplicated	NA	High <sup>xxxvi</sup>

## Nutrition, health and food security

### # people benefiting from relevant CGIAR innovations

We estimate that F2R-CWANA and its Innovations will benefit about 3.5 million people, in the five countries of Morocco, Egypt, Lebanon, Sudan and Uzbekistan (1.4% of the predicted population of 261 million in 2030), many of whom are currently malnourished and below the poverty line. The estimated Depth of the expected benefits is conservatively estimated to be “Substantial” for all indicators and we only included innovation packages for which the estimated likelihood of impact is at least “Medium”. The estimates consider the expected impact of the nine Innovations included in the 4.1 Innovation Packages and Scaling Readiness Plan. They account for the direct impact of each Innovation on participating farmers and the indirect impacts that are expected on other farmers from spillover effects from the uptake of technical innovations, tools and policies<sup>50</sup>. With an assumed budget of USD 30 million over three years, we estimate that F2R-CWANA will be able to reach around 240,000 farmers and agents directly through community-based approaches, extension systems, private service providers and digital platforms at an average cost of about USD 124 per direct beneficiary. For the “Scale-appropriate Mechanization” Innovation, we assume that each participating agent will reach 200 farmers by 2030<sup>xli</sup>. For the other Innovations, we assume that the farmer-to-farmer diffusion factor is 5 on average<sup>xlii,51</sup>, based on CGIAR experience with comparable projects and the literature<sup>xliii,52</sup>. When factoring in the diffusion rate, the cost

<sup>xxxix</sup> Where improved management delivers two of the following three benefits: improvements in soil health and fertility, delivers biodiversity gains, and provides additional ecosystem service improvements.

<sup>xl</sup> Reducing water use in areas where agriculture takes 12.5-50% of total renewable freshwater.

<sup>xli</sup> As a comparison, the extension agent-to-farmer ratio in Africa ranges from 1:3,000 to 1:10,000 ([AGRA](#)).

<sup>xlii</sup> Adoption rates and related diffusion factors are crop-specific in the case of seeds and vary widely across technologies and countries. For example, Walker & Alwang (2015) find that the area under modern varieties increased from 20-25% in 1998 to 35% in 2010 in their crop/country sample, which is an adoption rate of 1.45% per annum. Translating that into an “annual diffusion rate” of 1.45, or a diffusion factor of  $1.45^{(t1-t0)}$ , where  $t1-t0$  is the period of interest (8 years, in F2R-CWANA example) = diffusion factor of 19.5 over 8 years. A similar calculation for Sudan, where the area under modern varieties went from 22% to 40% over 11 years (1998 to 2009) would yield an annual diffusion rate of 1.0837%, or a diffusion factor of  $1.0837^8 = 1.9$  until 2030, based on ASTI <https://asti.cgiar.org/diiva/sudan/sorghum>.

<sup>xliii</sup> In Egypt, nine different investments in agrifood system innovations lead to productivity increases between 2%-100%. (Thurlow *et. al.*, 2020).



per beneficiary reached is substantially reduced to USD 8.50. We assume that the bundle of Innovation Packages will lead to an average increase in yields of 10% and that while the increase in yield may not fully translate into a corresponding increase in income, the Depth of the impact will be “Substantial”.

#### Poverty reduction, livelihoods and jobs

##### **# poor people benefiting from relevant CGIAR innovations**

F2R-CWANA targets smallholder farmers who are predominantly the poorest population in the CWANA region. We anticipate that the 3.5 million people projected to benefit from CGIAR Innovations are likely to experience reduced poverty and improved livelihoods.

#### Gender equality, youth and social

##### **# women benefiting from relevant CGIAR innovations**

We anticipate that F2R-CWANA will benefit 1.6 million women, and 1.2 million youth. Given the important, but often undervalued role that women play in farming in the CWANA region, the Innovation packages aim to reach a share of women among project beneficiaries between 30-50 %.

##### **# youth benefiting from relevant CGIAR innovations**

CWANA has an ageing farming population and high rates of youth rural to urban migration. The Innovation packages aim to involve a substantial share of youth with an expected participation rate of 35 % among all beneficiaries.

#### Climate adaptation and mitigation

##### **# people benefiting from climate-adapted innovations**

The F2R-CWANA initiative is projected to benefit 2.4 million people by using climate-adapted innovations and expected to contribute to national climate adaptation and mitigation priorities and targets. Of the nine Innovations, six explicitly promote climate smart innovations and to contribute to climate change adaptation and mitigation strategies. Examples for climate-adapted innovations include the adoption of more drought tolerant seeds, climate-smart farm management practices, conservation agriculture and mechanization services.

#### Environmental health and biodiversity

##### **# ha under improved management**

We estimate that F2R-CWANA Innovations will result in the improved management of 5.3 million hectares of land by 2030, equivalent to 4.1% of agricultural land, assuming that the average size of land per smallholder farmer across CWANA is 1.5 ha.

The genetic, agronomic, policy, institutional, and digital innovation packages proposed under this Initiative are selected to maximize synergies and minimize trade-offs. All initiative WPs ask how these innovations

perform across all CWANA agro-ecological systems, how they should be adapted and what impact (positive or negative) there will be when taking agri-food transitions to scale. Within a region like CWANA, and as indicated in terms of the significant issues affecting rural development, there will be impact on socio-economic and environmental conditions, which are further affected by how this can be facilitated across government priorities and commitments in each target country. Over the years, the partner centers for F2R-CWANA have been generating evidence on the factors that limit large-scale adoption and impacts in the Region, and the short- and long-term socio-economic, biophysical, and environmental viability of the technologies that have been nominated for scaling under F2R-CWANA<sup>14,53,54,55</sup>. An example of this is the following: several studies in CWANA have documented clear synergistic livelihoods, biophysical, and environmental benefits to Conservation Agriculture (CA)<sup>56,57,58,59,60</sup> one of the technologies to be scaled under the initiative.

The projections of beneficiaries and benefits are based on past ex-ante and ex-post studies and suitability analysis for different technologies. The nature of genetic and technological innovations proposed under the initiative also infer that there are inherent trade-offs across the CGIAR impact areas. For example, unlike some targeted interventions, the genetic and technological innovations proposed under this initiative are most likely to benefit rural and farming households in the Region, many of which remain poor. There is an implicit trade-off between breadth of impact in terms of reducing poverty and reach of these innovations. Additionally, it should be noted that while some innovations may be prioritized to young and women, the genetic and technological innovations proposed under this initiative are likely to benefit broader set of farming households. In fact, some of the technologies promoted, such as conservation agriculture, as well as strengthening women's involvement in decent employment will accentuate women's double burden and time poverty<sup>61</sup>. We are aware of such trade-offs and they will be mitigated through simultaneous efforts focused on increased technical innovation (such as reducing drudgery through mechanization) complemented by crop traits which help to reduce workload (naked barley and low threshing). The focus of WP1 is to identify additional synergies and trade-offs to support the prioritization of target innovations throughout the Initiative. Key actions in this WP will be to explain two essential actor-based/participatory processes used for addressing the issue of trade-off and synergies: (1) the process for selecting impact indicators versus five impact domains (productivity, economic and environmental efficiencies, human and social benefits) and their prioritization (national/sub-national specific), and (2) the process for identifying trade-offs and synergies across the five domains. The actor-based/participatory processes will apply relevant protocol and tools proposed by the Sustainable Intensification Assessment Framework<sup>62</sup> (among others) that is adopted by CGIAR centers (e.g. CIMMYT). In WP3, with respect to particular trade-offs and synergies needing proper quantification, we will additionally add how Integrated Systems Assessment and Modelling methods will be used for related adoption analysis, ex-post and ex-ante assessments considering trade-offs with various indicators.

### **# km3 consumptive water use**

WP4 focuses on water and water-saving innovations in a region where agriculture takes more than half of fresh water. Thus, we project that this initiative will generate significant gains in terms of reducing water

usage and improving the efficiency of water (e.g. <sup>63,64,65,66</sup>). In terms of reducing consumptive water use, we anticipate that the alternative innovations to improve the productivity, efficiency, storage and recycling of water in the CWANA region can increase ratio of non-traditional water resources to total water resources usage by 5-10% in the region. This translates to a 10%-20% reduction (savings) in consumptive water per country across the five countries in the region. Using baseline data (from FAOSTAT) on consumptive water usage for each country, we project that the F2R-CWANA initiative will achieve a 5.75 BCM reduction in consumptive water usage by 2030.

#### **# plant accessions available and safely duplicated**

WP2 includes a focus on genetic conservation and we anticipate that these activities will generate significant gains in genetic conservation. Based on previous experience, we project that the resource conservation technologies, inclusive of appropriate mechanization and sustainable cropping systems for dryland and irrigated systems, will lead to adoption of conservation agriculture package of practices. Using these pieces of information, we project that the F2R-CWANA initiative will lead to accession and duplication of 1,500 plant genotypes.

## **3. Research plans and associated theories of change (ToC)**

### **3.1 Full Initiative Research Plans and ToC**

The CWANA region is one of the “hotspot” regions for climate change, where ensuring water and land resource extraction remain within planetary boundaries is critical. Whereas agricultural research has the potential to address this challenge, most agricultural research conducted in CWANA does not reflect the real needs of farmers. Consequently, there is a gap between the results of national and international agricultural research and its usefulness to farmers, mainly because of lack of localized research adapted to meet the needs of stakeholders, weak technology transfer, poor dissemination of information and ineffective extension services<sup>14</sup>. The F2R-CWANA entails a participatory and holistic approach to harness science-based solutions to the challenges of the CWANA region. It links across Global CGIAR Initiatives to objectively validate bundle of technologies to fit the needs of the CWANA region.

The F2R-CWANA Initiative will develop and harness global genetic innovations most suited for CWANA. On-station, on-farm and off-farm participatory assessments will be conducted to ensure that the resultant varieties/breeds/strains are not only climate-smart but suite the preferences of male and female farmers. National Alliance of Stakeholders (NAS) will play a key role of prioritizing and balancing trade-offs across attributes based on both the participatory assessment data and cost-benefit analyses. To further ensure that the crop varieties developed are best suited to the CWANA agroecology, the F2R-CWANA Initiative will develop management packages for the on-farm conservation of agrobiodiversity and collect accessions of endemic agrobiodiversity found in hotspots for conservation and use in genebanks and subsequent use in breeding. The developed varieties will be put at the disposal of NARS and seed certification agencies for onward registration and release.

To maximize gains to farmers, a diversified seed systems approach will be used to ensure that commercial varieties are delivered through the established conventional formal seed channels and less commercial/breeds/strains varieties are disseminated by farmer-based seed producers. Previous research by ICARDA has shown that small seed enterprises helped meet the diverse seed needs of farmers in less favourable and remote areas<sup>67,68</sup>. Inclusive access to climate-resilient, nutritious, and market-demanded varieties/strains/breeds will enable a broad range of farm households to narrow the yield gap, withstand the adverse effects of climate change on their farm enterprises, thus increase farm employment and incomes and enhance food security at household-, community- and country-level. It is assumed that seed sector players (seed companies, farmer-based seed enterprises) will embrace the developed seed varieties.

The F2R-CWANA Initiative will identify evidence-based, socially inclusive agronomic management practices for use as bundled solutions. Investment strategies and gender- and youth-sensitive business models will be developed to facilitate the scaling of the bundled agronomic management practices. The bundled agronomic practices will be an integral part (input) of the crop/fish/livestock breeding strategy/program especially in conducting trials and assessments before eventual recommendation for registration and release. The adoption of bundled agronomic management practices will synergize the genetic innovations to sustainably bridge the yield gaps in diverse farming systems.

The F2R-CWANA Initiative will promote the integrated governance of the food, land, water and energy systems by developing appropriate decision-support tools and gender-responsive management plans, guidelines/frameworks, investment strategies, and policy advice. Integrated water storage management, water recycling and re-use approaches with favourable cost-benefit profiles will be promoted amongst marginal communities at country and regional/watershed scale. This will improve water availability, reliability, water productivity and climate resilience. The integration and scaling up of aquaculture and agriculture will be promoted in marginal and saline landscapes. Research has shown that the integration of aquaculture-agriculture results in “more crop per drop,” higher total factor productivity, higher farm income per hectare, and higher returns to family labour<sup>69,70</sup>.

The F2R-CWANA Initiative will conduct comprehensive assessments of and harness existing climate and market information tools and where appropriate partner with incubators/accelerators to develop the capacity of youth/women to develop digital innovations. Proto-type digital tools will be brought to scaling readiness and innovators matched with prospective investors. F2R-CWANA will facilitate the development of policies and business models for youth-inclusive entrepreneurship and build the capacity of end-users of the digital innovations and tools. Scaling of innovative digital tools for climate and market information will enable agricultural food value chain (FVC)<sup>xliv, 71, 72, 73</sup> actors to manage the respective risks by

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<sup>xliv</sup> Food Value Chains are defined as: strategic alliances between farms or ranches and other supply-chain partners that deal in significant volumes of high-quality differentiated food products and distribute rewards equitably across the chain (Diamond *et al.* (2014); a business model in which producers and buyers of agricultural products form strategic alliances with other supply chain actors, such as aggregators, processors, distributors, retailers, and consumers, to enhance financial returns through product differentiation that advances social or environmental

rationalising production and marketing decisions thus contributing to resilience of farming systems and increasing the profitability of agriculture.

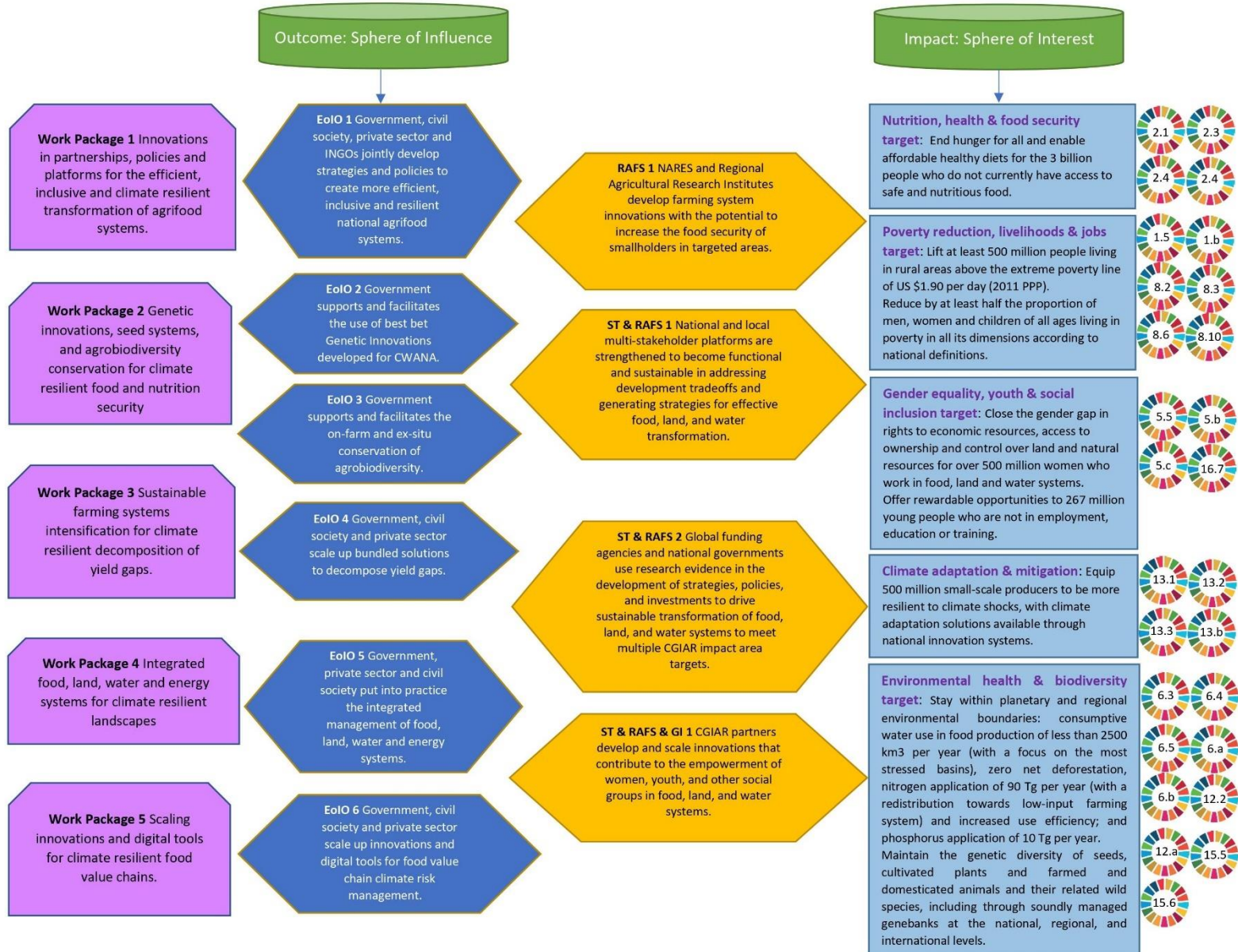
The F2R-CWANA Initiative will conduct participatory analyses of gender-specific challenges and opportunities to/for the attainment of efficient, inclusive and resilient food systems. It will further study the challenges that preclude the attainment of effective, inclusive and resilient design and implementation of policies and associated innovations. The resultant finding and recommendations will be discussed in multi-stakeholder fora (NAS), comprising of government, civil society, private sector and INGOs. The NAS will determine enabling policies, their synergies, and trade-offs which will form the basis for F2R-CWANA policy advice. “Living Labs” (Innovation Platforms) situated on the ground in the agro-ecologies and communities will be useful for the participatory testing, assessment, and prioritization of technologies, tools, approaches, and innovations. It is assumed that the Innovation Platforms will be representative of the end-users and that there will be no conflict of interest among the members of the NAS, such that the resultant innovations and bundled solutions will reflect the needs and demands of farmers and smallholders and the developed strategies and policies create efficient, inclusive, and resilient national agri-food systems. F2R-CWANA will have embedded impact evaluation studies whose results will inform future research and development undertaking on what worked, what did not work and the factors that contributed or deterred the achievement of stated objectives and results.

F2R-CWANA will contribute to One CGIAR Impact Areas and the Sustainable Development Goals (SDGs) through improved food security, nutrition and health; increased employment, improved livelihoods resulting in reduced poverty; enhanced gender equality and social inclusion; enhanced climate change adaptation and mitigation as well as enhanced environmental health and biodiversity.

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values. Value chains are formed intentionally on the central principle that transparent and trusting relationships between supply chain partners can produce positive, win-win outcomes for all parties involved. Partners in these business alliances recognize that creating maximum value for their products depends on interdependence, collaboration, and mutual support. The financial rewards accrued through these value chain alliances are shared equitably among partners (USDA, accessed 2022); a network of stakeholders involved in growing, processing, and selling the food that consumers eat—from farm to table. This includes (1) the producers that research, grow, and trade food commodities, such as corn and cattle; (2) the processors, both primary and value added, that process, manufacture, and market food products, such as flour and bread; (3) the distributors, including wholesalers and retailers, that market and sell food; (4) the consumers that shop, purchase, and consume food; as well as (5) governments, non-governmental organizations (NGOs), and regulators that monitor and regulate the entire food value chain from producer to consumer (Deloitte, accessed 2022).





## 3.2 Work Packages Research Plans and ToCs

### 3.2.1 Work package 1 research plans and ToC: Innovations in partnerships, policies, and platforms for the efficient, inclusive, and climate-resilient transformation of agrifood systems

Work Package 1 title	<b>Innovations in partnerships, policies and platforms for the efficient, inclusive and climate-resilient transformation of agrifood systems.</b>
Work Package main focus and prioritization	Many countries in CWANA experience declining agricultural production as a result of conflict, gender inequalities, youth unemployment, and farmers' struggle to access resources, new agricultural technologies and practices (such as climate-smart agriculture [CSA]) and manage risks as they are not adequately supported by policies and institutions. Countries in CWANA are heterogeneous, with public policy processes that are generally complex and not necessarily responsive to emerging development challenges. In fragile contexts in the region, public institutions have limited capacity to address needs on the ground, while even in stable contexts, state institutions do not have a strong history of accountability for policy results <sup>17</sup> . Conversations with policy makers in Egypt, Uzbekistan and Morocco reveal a strong emerging interest in evidence-based policy. This work package prioritizes an active engagement with key regional stakeholders and understand how policy, regulatory, institutional, and technological innovations can transform the agri-food systems in the region to make them inclusive, efficient, and resilient to external shocks and climate change. This process will be implemented through the setting up of National Alliances of Stakeholders and understanding institutional constraints as a key factor in enabling CGIAR scientific innovations to reach farmers at scale, through setting up new National Innovation Platforms (NIPs) or strengthening existing ones.
Work Package geographic scope	1-CWANA: EG-Egypt, LB-Lebanon, MA-Morocco, SD-Sudan, UZ-Uzbekistan

#### The Science:

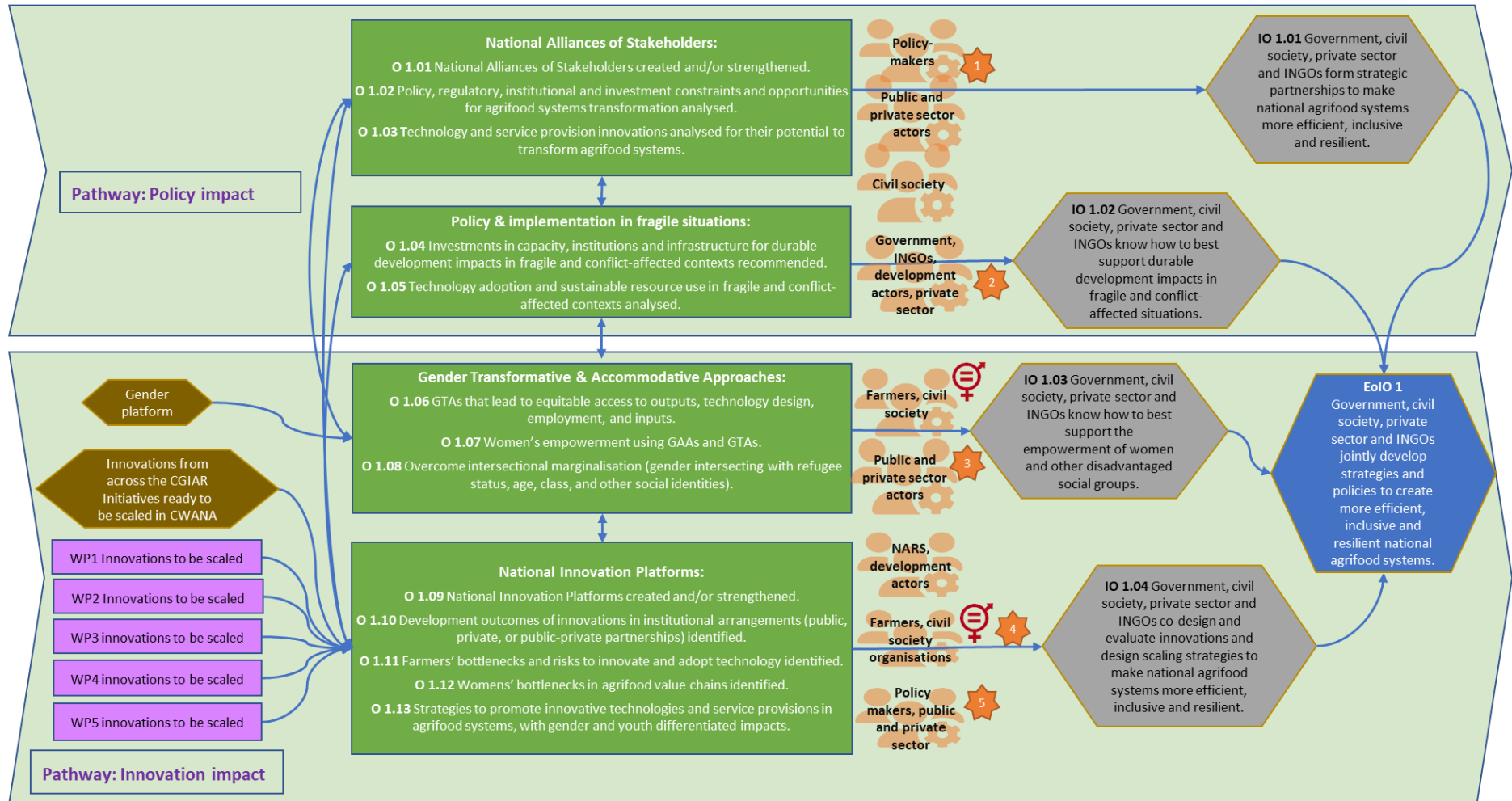
Research questions	Scientific methods	Key outputs
<b>RQ 1.01</b> What are the main challenges and opportunities to make national agrifood systems more efficient, inclusive, and resilient?	<p>Analysis of policy constraints and key drivers of policy change in agrifood systems of selected countries using the Kaleidoscope model of policy change, social network analysis, and other qualitative research methods.</p> <p>Evaluation of alternative policy, regulatory, and investment options and their impact on poverty, nutrition, gender inclusion, and climate adaptation</p>	<p><b>O 1.01</b> National Alliance of Stakeholders (NAS) created and/or strengthened.</p> <p><b>O 1.02</b> Policy, regulatory, institutional, and investment constraints and opportunities for agrifood systems transformation analysed.</p> <p><b>O 1.03</b> Technology and service provision innovations analysed</p>

	<p>using value added production functions, economy-wide and microsimulation models.</p> <p>Cost-benefit and cost-effectiveness analyses and environmental assessments of technological innovations.</p> <p>Networking, engagement, policy dialogue and training activities.</p>	for their potential to transform agrifood systems.
<b>RQ 1.02</b> How can policy design and implementation in fragile and conflict-affected situations be made more effective, inclusive, and resilient?	<p>Analysis of existing remote sensing, or secondary source data using econometric identification methods to study the relationship between conflict exposure, water and land resource use, and agricultural production choices.</p> <p>Impact evaluation studies on interventions supporting technology adoption in fragility or conflict-affected situations.</p>	<p><b>O 1.04</b> Investments in capacity, institutions and infrastructure for durable development impacts in fragile and conflict-affected contexts recommended.</p> <p><b>O 1.05</b> Technology adoption and sustainable resource use in fragile and conflict-affected contexts analysed.</p>
<b>RQ 1.03</b> What gender-transformative approaches (GTAs) and gender accommodative approaches (GAAs) can lead to the empowerment of women in CWANA and address gender-specific bottlenecks (limited access to technologies, information, land rights)?	<p>A multi-staged methodological process.</p> <p>First phase: Desk review on gender transformative approaches that has worked well in sex-segregated culture.</p> <p>Second phase: Design of activities with technical teams, development organizations (e.g., Oxfam) and rural collectives, after which the GTAs will be implemented to redress power imbalances inside the cooperatives and redress gender norms (around stereotypes, intersectional marginalization, and entrepreneurship).</p> <p>Final stage: Meta-analysis of qualitative and quantitative data/evidence collected related</p>	<p><b>O 1.06</b> GTAs that lead to equitable access to outputs, technology design, employment, and inputs developed and tested.</p> <p><b>O 1.07</b> Evidence based best practices for women's empowerment using GAAs and GTAs documented.</p> <p><b>O 1.08</b> Recommendations to overcome intersectional marginalisation (gender intersecting with refugee status, age, class, and other social identities) developed.</p>



	around GTA-induced changes and remaining obstacles in the different countries.	
<b>RQ 1.04</b> What institutional innovations are needed to achieve the transformation of efficient, inclusive, and resilient agrifood systems?	<p>Impact evaluation studies (including randomised control trials) that test innovations in institutional arrangements in agrifood systems of the selected countries.</p> <p>Gender disaggregated survey and impact evaluations with farmers and other relevant actors in the agrifood systems about their adoption of innovations and technologies.</p> <p>Impact evaluation studies (including randomized control trials) that assess adoption and impact of innovative technologies.</p> <p>Conduct multi-actor analysis at the early stage of the implementation of the Initiative to design an operational structure, to characterize and/or classify the actors, their roles, and the institutional opportunities and constraints they will bring to the Multi-Actor Platform.</p> <p>Case studies with farmers (including women and youth) that pilot and rigorously assess the potential for scaling up technological and service provision innovations.</p>	<p><b>O 1.09</b> National Innovation Platforms (NIPs) created and/or strengthened.</p> <p><b>O 1.10</b> Development outcomes of innovations in institutional arrangements (public, private, or public-private partnerships) identified.</p> <p><b>O 1.11</b> Farmers' bottlenecks and risks to innovate and adopt technology identified.</p> <p><b>O 1.12</b> Women's bottlenecks in agrifood value chains identified.</p> <p><b>O 1.13</b> Strategies to scale innovative technologies and service provisions in agrifood systems, with a focus on gender and youth disaggregated impact, developed.</p>

**Work Package 1: Innovations in partnerships, policies, and platforms for the efficient, inclusive and climate resilient transformation of agrifood systems.**



## The Theory of Change:

Work Package 1 hopes to achieve **EoIO 1**, that government, civil society, private sector and INGOs jointly develop strategies and policies to create more efficient, inclusive and resilient national agrifood systems. Working through a policy impact pathway, we hope to achieve two intermediate outcomes to help arrive at this EoIO. **IO 1.01**, aims for these same actors to form strategic partnerships, which F2R-CWANA will facilitate by providing the enabling conditions for key stakeholders to come together, engage and form new strategic partnerships and further strengthen National Alliances of Stakeholders (**O 1.01-1.03**). The Alliance of Stakeholders will be the forum by which regional issues, priorities, innovations, and are discussed and worked out. The assumption is (1) that key partners will want to join and participate in the NAS because it will provide them with the opportunity to meet and influence other stakeholders while setting the priorities and direction for important regional issues related to transforming agrifood systems in their respective contexts. The risks are that key stakeholders do not join the National Alliance, or that participation within the Alliance is somehow unbalanced, unrepresentative, or otherwise inadequate. **IO 1.02** aims for these same actors to build capacity to best support durable development impacts in fragile- and conflict-affected situations, which we will facilitate through providing an analysis of policy design and implementation options (**O 1.03-1.05, Innovation 1: Rural Investment and Policy Analysis (RIAPA) Modeling Toolkit**), providing these actors with crucial evidence-based guidance to make influential and durable development decisions in region where fragility and conflict are chronic. The assumption is (2) that these actors are willing and able to consider how to effect long lasting positive change in the face of these significant challenges.

Concurrently, working along an innovation impact pathway, **EoIO 1** will be achieved through work on gender leading to **IO 1.03**, that government, civil society, private sector and INGOs know how to best support the empowerment of women and other disadvantaged social groups; and another area of work on NIPs leading directly to the **EoIO 1**. To achieve the **IO 1.03**, we will provide Gender Accommodative Approaches (GAAs) and Gender Transformative Approaches (GTAs) that, in collaboration with the Gender Platform, have been tested and shown to deliver impact in CWANA local contexts (**O 1.06-1.08**). With this knowledge and toolbox, it is expected that the stated actors will implement these approaches to the best of their abilities, on the assumption that (3) the empowerment of women and other disadvantaged groups (e.g. refugees and displaced persons, poor, youth, elderly) is seen as a crucial step to achieve long lasting, positive and peaceful development outcomes in the region, especially related to climate-resilient food, nutrition, and livelihood security.

In alignment with the above, the final group of outputs within the innovation impact pathway lead to **IO 1.04** – that government, civil society, private sector, and INGOs co-design and evaluate innovations and develop scaling strategies to make national agrifood systems more efficient, inclusive and resilient - are about setting up/strengthening NIPs (**O 1.09-1.13 and IPSR O 1-2, Innovation 2: CGIAR Innovation Accelerator and Open Innovation Program**) which are physical “Living Labs” situated on the ground in the agro-ecologies, and communities, and partnership networks that are necessary to enable testing of technologies, tools, approaches, and ultimately Innovations, developed by F2R-CWANA and other

Initiatives, for the people in CWANA. The Innovation Packages and Scaling Readiness work will be undertaken through Innovation Platforms. By setting up/strengthening NIPs, thereby providing excellent conditions for government, private sector, civil society and INGOs to work together, we assume these actors will work together to create efficient, inclusive and resilient national agrifood systems because (4) the enabling environment exists; and (5) it is in the interests of all parties – wherever they are along the value chain and impact pathway - providing a synergistic win-win situation for each entity. The risks here are that conflicts of interest – where a decision or action that is considered most appropriate by the NAS is at odds with an individual partner’s interest – may lead to a failure of policy change, technology adoption, and an inadequate assessment of the intervention’s impact, and furthermore that the political sensitivities in national contexts to international involvement may make it challenging to maintain a safe and credible “research space”.

Annex of Partners [here](#).

### 3.2.2 Work package 2 research plans and ToC: Genetic innovations, seed systems, and agrobiodiversity conservation for climate-resilient food and nutrition security

Work Package 2 title	<b>Genetic innovations, seed systems, and agrobiodiversity conservation for climate-resilient food and nutrition security</b>
Work Package main focus and prioritization	Work Package 2 focuses on facilitating the availability of Genetic Innovations developed explicitly to meet the demands of the region. This WP focuses on an inclusive and efficient seed system for quick varietal turnover, and on-farm management and ex-situ conservation of agrobiodiversity underpinned by facilitating strengthened and more effective enabling environments. These objectives will be reached through the development of an integrated feedback network of information, tools and innovations between F2R-CWANA and the Global Genetic Innovation Initiatives (ABI, MIPP and SeEdQUAL) to maximize the synergies between Initiatives, and between regional stakeholders using NAS and NIPs.
Work Package geographic scope	1-CWANA: EG-Egypt, LB-Lebanon, MA-Morocco, Sudan-SD, UZ-Uzbekistan

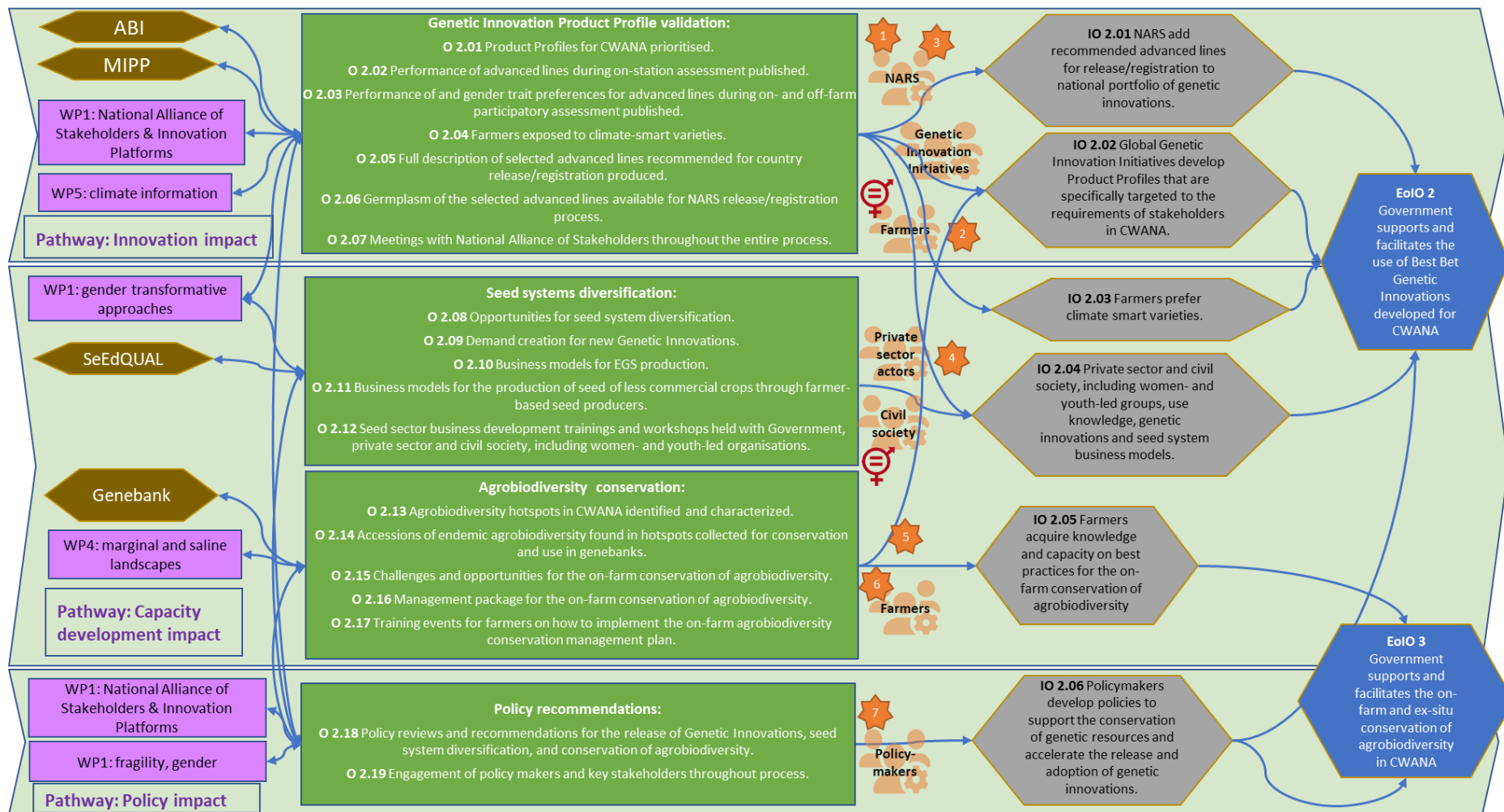
#### The science:

Research questions	Scientific methods	Key outputs
<b>RQ 2.01</b> How can the Global Genetic Innovations most suitable for CWANA be developed and brought to demand partners?	Consultation with National Alliance of Stakeholders (NAS) to identify and prioritize Global Genetic Innovation Product Profiles using gender responsive tools for CWANA.	<b>O 2.01</b> Product Profiles for CWANA prioritised.  <b>O 2.02</b> Performance of advanced lines during on-station assessment published.

	<p>On-station (with NARS, women and men farmers and stakeholders) assessment and validation of selected Product Profiles advanced lines.</p> <p>On-farm (with NARS, women and men farmers and stakeholders) and off-farm participatory gender-specific validation activities of Product Profile advanced lines performance and nutritional quality selected during on-station testing.</p> <p>1-3 advanced lines per Product Profile that are best suited to the needs of the countries recommended for release/registration.</p> <p>Participate in feedback loop to NAS, G+ Tools implementation, and Genetic Innovation Initiatives about Product Profile validation results to inform future breeding activities.</p>	<p><b>O 2.03</b> Performance of and gender trait preferences for advanced lines during on- and off-farm participatory assessment published.</p> <p><b>O 2.04</b> Farmers exposed to climate-smart varieties.</p> <p><b>O 2.05</b> Full description of selected advanced lines recommended for country release/registration produced.</p> <p><b>O 2.06</b> Germplasm of the selected advanced lines available for NARS release/registration process.</p> <p><b>O 2.07</b> Meetings with National Alliance of Stakeholders throughout the entire process.</p>
<b>RQ 2.02</b> How can seed systems be made more efficient, inclusive, and resilient?	<p>Analysis of seed system (supply side) and adoption and impact (demand side) to understand the systemic challenges and opportunities of diversification.</p> <p>On-farm participatory demonstration of climate-smart varieties, demand creation, and cost benefit analysis.</p> <p>Analysis of Early Generation Seed (EGS) production models.</p> <p>Feasibility and profitability analysis of alternative models of seed production for less commercial crops (e.g. legumes).</p>	<p><b>O 2.08</b> Opportunities for seed system diversification identified.</p> <p><b>O2.09</b> Demand creation for new Genetic Innovations.</p> <p><b>O 2.10</b> Business models for EGS production developed.</p> <p><b>O 2.11</b> Business models for the production of seed of less commercial crops through farmer-based seed producers developed.</p> <p><b>O 2.12</b> Seed sector business development trainings and workshops held with</p>

	Seed sector business development trainings and workshops.	Government, private sector and civil society, including women- and youth-led organisations.
<b>RQ 2.03</b> How can the unique agrobiodiversity of the CWANA region be better sustained and conserved?	<p>Gap analysis for the identification and characterization of agrobiodiversity hotspots.</p> <p>Collecting missions.</p> <p>Participatory assessment with farmers on key challenges and opportunities for on-farm conservation of agrobiodiversity.</p> <p>Testing, validation and participatory promotion of on-farm agrobiodiversity conservation in hotspots.</p> <p>Training farmers on on-farm agrobiodiversity conservation management plan.</p>	<p><b>O 2.13</b> Agrobiodiversity hotspots in CWANA identified and characterized.</p> <p><b>O 2.14</b> Accessions of endemic agrobiodiversity found in hotspots collected for conservation and use in genebanks.</p> <p><b>O 2.15</b> Challenges and opportunities for the on-farm conservation of agrobiodiversity documented.</p> <p><b>O 2.16</b> Management package for the on-farm conservation of agrobiodiversity developed.</p> <p><b>O 2.17</b> Training events for farmers on how to implement the on-farm agrobiodiversity conservation management plan.</p>
<b>RQ 2.04</b> What are the major policy related challenges and opportunities for promoting Genetic Innovations and genetic resources in CWANA?	<p>Analysis of policy and regulatory constraints for the conservation of agrobiodiversity and the adoption of Genetic Innovations in CWANA.</p> <p>Analysis of socioeconomic data on seed system, and variety adoption.</p> <p>Advocacy, policy dialogues.</p>	<p><b>O 2.18</b> Policy reviews and recommendations on the release of Genetic Innovations, seed system diversification, and the conservation of agrobiodiversity.</p> <p><b>O 2.19</b> Engagement of policy makers and key stakeholders throughout process.</p>

## Work Package 2: Genetic innovations, seed systems, and agrobiodiversity conservation for climate resilient food and nutrition security





## The Theory of Change:

Work Package 2 will work towards achieving two goals regarding genetic innovations and genetic resources for CWANA. **EoIO 2** (first goal), is that Government supports and facilitates the use of Best Bet genetic innovations developed by the Genetic Innovation Initiatives ABI and MIPP to expressly meet the needs of people in CWANA, given the prevailing climatic and agro-ecological conditions, and the trait preferences of men and women (**O 2.01-2.07, Innovation 3: Participatory Product Profile Performances**). This will be achieved through an innovation impact pathway, by many actors – CGIAR, NARS, breeders, farmers, government, private sector and civil society groups - working together through NAS (O 1.01) and NIPs (O 1.09, both housed in WP1) to maximise the regional impact of GI technologies and tools. We will prioritise Product Profiles from the perspective of regional stakeholders, validate the performance of advanced lines, including via participatory on-station and on- and off-farm with farmers and other value chain actors, and help to fast-track the best performing and preferred lines with NARS for release/registration. Valuable technical and trait preference knowledge generated during this process will be communicated back to the GI Initiatives ABI and MIPP for future Product Profiles creation based on the needs of CWANA stakeholders. The assumptions are that (1) within the Product Profiles (advanced lines) prioritised by the NAS that there are ones that are climate-smart and will thrive in CWANA conditions and (2) be wanted by farmers, industry, consumers, and other actors; and (3) that NARES undertake the release/registration process. The risks are that the prioritized Product Profiles do not thrive in the conditions of CWANA and/or are not appreciated by the various stakeholders; and that successful Product Profiles are not taken through the release/registration process by the relevant local authorities.

Concurrently, within a capacity development impact pathway to diversify national seed systems, new business models will be developed to produce seed of commercial, and less commercial, crops that both private/public companies and community organisations, including youth and women led organisations, can implement (**O 2.08-2.11**). This will be done in conjunction with Seed Equal and provide feedback to the CGIAR Community of Excellence on Seed System Development (CoE SSD). Communication and feedback between all stakeholders will be maintained to develop and deliver to farmers the climate smart genetic innovations needed to sustain agriculture in the region. The analysis of seed systems, varietal adoption and impacts under WP2 aims to address three critical areas on the relevance and choice of technologies/innovations and understand systemic constraints for delivery and uptake of these, underpinned by advocacy for an enabling policy environment. The adoption study determines the adoption constraints, identify farmers varietal choices differentiated by gender, rate of varietal replacement in farmers' fields, and validate the relevance and priority of product profiles for the CWANA region. The impact studies demonstrate the benefits accrued from use of the new generation of genetic innovations. This is coupled with demand creation and awareness to demonstrate the profitability from use of the new innovations. The assumptions are that (4) the business models for diverse and functional seed systems meet the needs of the farmers, are profitable, and can be implemented by diverse value chain actors.



**EoIO 3** (second goal) is that Government supports and facilitates the on-farm and ex-situ conservation of agrobiodiversity along the capacity development impact pathway. This will be facilitated through a gap analysis, collecting missions to agrobiodiversity hotspots, co-development of on-farm conservation management plans, and farming with alternative pollinators, helping to ensure that endemic crops, crop wild relatives, and associated biodiversity of agroecosystems in CWANA continue to evolve to the prevailing conditions on farm (on-farm conservation) and are kept in genebanks (e.g. Genebank Initiative) for long term safeguarding and available for use in CGIAR breeding programmes (**O 2.13-2.17, Innovation 4: In-situ Conservation of CWANA Dryland Agrobiodiversity**). A wealth of heat and drought-stress adapted genetic resources are vital to breed climate smart varieties. This impact pathway therefore also contributes to **EoIO 2**. The assumptions are (5) that agrobiodiversity hotspots can be identified, reached and accessions collected; and (6) that the management plan can address all constraints so that farmers see the value in the on-farm conservation and management of agrobiodiversity. The risks are that agrobiodiversity hotspots are no longer present, and/or that the in-situ conservation management plans are not followed by the farmers.

Supporting these goals is a policy impact pathway aiming to foresee constraints and provide recommendations to overcome them, working closely with the NAS, NIPs, and policymakers (**O 2.18-2.19**). The assumptions are (7) that policy makers are willing and able to address these policy issues to create an enabling environment for the uptake of these GI and other innovations. The risk is that they are unwilling or unable to make necessary changes to policy.

Annex of Partners [here](#).

### 3.2.3 Work package 3 research plans and ToC: Sustainable farming systems intensification for the climate-resilient decomposition of yield gaps

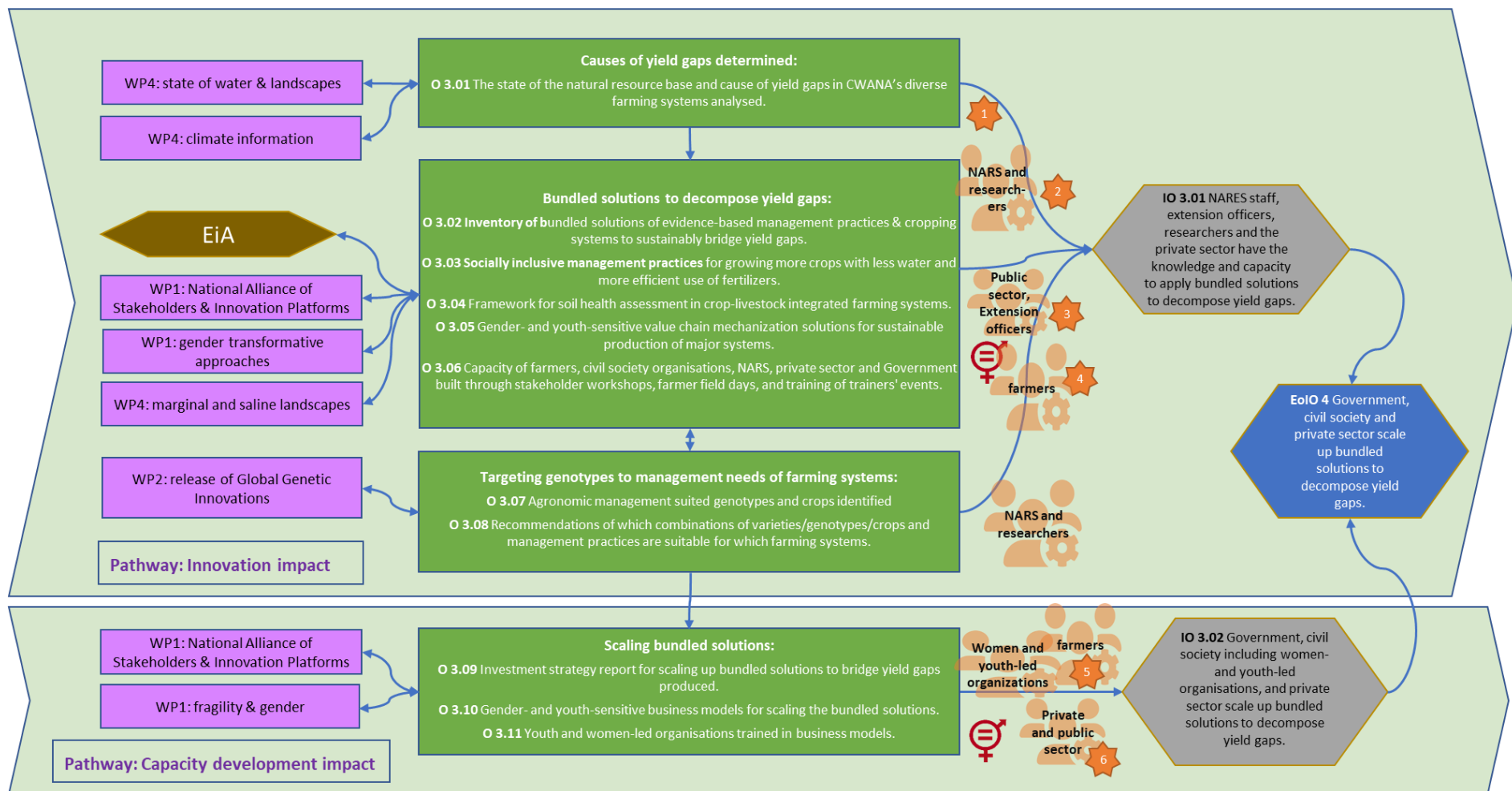
Work Package 3 title	Sustainable farming systems intensification for climate-resilient decomposition of yield gaps
Work Package main focus and prioritization	WP3 focuses on the sustainable intensification of principal farming systems to build resilience to climate risks and decompose the yield gaps within planetary boundaries. CWANA is the most water-stressed region in the world with low fertile soils and poor on-farm agronomic management practices leading to large yield gaps, poor resource efficiency, low farm income, and food insecurity coupled to a heavy dependence on food and grain imports. The region's insufficient knowledge and service delivery infrastructure, capacity and enabling policies are key bottlenecks for producers, SMEs, and value chain actors to access resources to enhance the adoption of sustainable options (e.g. conservation agriculture) and to manage and mitigate risks.
Work Package geographic scope	1-CWANA region: EG-Egypt, LB-Lebanon, MA-Morocco, SD-Sudan, UZ-Uzbekistan

**The science:**

Research questions	Scientific methods	Key outputs
<b>RQ 3.01</b> What is the current state of the natural resource base (soil and water), which act as determinants of yield gaps?	Data, simulation modelling.  Remote sensing, geo-spatial tools.  Literature review & secondary data.	<b>O 3.01</b> The state of the natural resource base and cause of yield gaps in CWANA's diverse farming systems analyzed.
<b>RQ 3.02</b> Which evidence-based agronomic management practices, inclusively adapted to different user groups, can be used as bundled solutions to bridge the yield gaps in diverse farming systems?	Use cropping systems optimization tools, field experiments (mother-baby trials), and decision-making tools, and data science.  Mitigation Options Tool (MOT) for life cycle analysis based GHG quantification.  Stakeholder workshops, field days, training of trainers.  Training modules and manuals.	<b>O 3.02</b> Inventory of bundled solutions of evidence-based management practices and cropping systems to sustainably bridge yield gaps in major production systems developed.  <b>O 3.03</b> Socially inclusive management practices for growing more crops with less water and more efficient use of fertilizers with lower environmental footprints developed.  <b>O 3.04</b> Framework for soil health assessment in crop-livestock integrated farming systems developed.  <b>O 3.05</b> Gender- and youth-sensitive value chain mechanization solutions for sustainable production of major systems identified.  <b>O 3.06</b> Capacity of farmers, civil society organizations, NARS, private sector and Government built through stakeholder workshops, farmer field days, and training of trainers' events, including training manual on sustainable intensification of cropping systems, conservation

		agriculture and scale appropriate mechanization developed.
<b>RQ 3.03</b> What management-targeted varieties/genotypes are needed to support resilient and sustainable farming systems?	Field experiment (mother- baby trials, Genotype x Environment x Management trials using genotypes from WP 2 and other GI initiatives), crop modelling, choice experiments, participatory approaches, use of geospatial tools.	<p><b>O 3.07</b> Agronomic management/cropping system adapted crops and genotypes identified to feed back to breeding strategy in WP 2.</p> <p><b>O 3.08</b> Recommendations of which combinations of crops/varieties/genotypes and management practices are suitable for different agro-ecosystems.</p>
<b>RQ 3.04</b> What are the challenges and opportunities for scaling sustainable, resilient and gender and youth responsive farming practices?	Participatory and Innovation platforms approaches, choice experiments, training, policy workshops, stakeholder consultations, use of scaling tools and business models.	<p><b>O 3.09</b> Investment strategy report for scaling up bundled solutions to bridge yield gaps.</p> <p><b>O 3.10</b> Gender- and youth-sensitive business models for scaling the bundled solutions.</p> <p><b>O 3.11</b> Youth and women-led organizations trained in business models.</p>

### Work Package 3: Sustainable farming systems intensification for climate resilient decomposition of yield gaps.



## The Theory of Change:

Work Package 3 will work towards achieving the goal of **EoIO 4**, that government, civil society and private sector scale up bundled solutions to decompose yield gaps and build resilient production systems. In an innovation impact pathway that has the intermediate outcome **IO 3.01** of equipping NARES staff, extension officers, researchers and the private sector with knowledge and capacity to apply bundled solutions to bridge yield gaps - first by determining the causes of yield gaps determined (**O 3.01**) . Next, a series of agronomic management solutions to overcome these within the boundaries of the natural resource base – using the principles of climate-smart agriculture and conservation agriculture - will be co-developed (**O 3.02-3.05**) with stakeholders through the National Stakeholder Alliance at the National Innovation Platform sites (O 1.01 and 1.09, housed within WP1). These solutions include the Innovations of mechanization (**O 3.05, Innovation 5: Scale-appropriate Mechanization**) and selecting the best varieties with good agronomic practices through capturing the Genotype x Environment x Management for resilient food and feed cropping systems, in collaboration with WP2 Participatory Product Profile Performance work (**O 3.07-3.08, Innovation 6: Resilient Food and Feed Crops**). The co-development of these and other solutions to bridge yield gaps, and capacity development for their application on-farm, will be done through regular stakeholder workshops, farmer field days, and training of trainer events (**O 3.06**), at the NIPs and involving the NAS. Partnering with EiA Initiative and the Gender Accommodative and Transformative Approaches of WP1, these solutions will be bundled together to form packages of gender and youth sensitive options that are adaptable to the range of diverse farming systems found in CWANA (**O 3.02**). The assumptions are (2) that these bundled solutions based on climate-smart and conservation-agriculture approaches help to bridge the production yield gaps and minimise their vulnerability to climatic and other risks; that (3) the bundled solutions are easy to use and more effective than existing options and will therefore be taken up NARES, extension agents, and so on as a strategy towards food security while addressing the grand challenges; and (4) that farmers - the ultimate end user of the bundled solutions to bridge yield gaps - see the value in this conservation and climate-smart agriculture approach and these solutions, over other alternatives. The risks are that the bundled solutions are not taken up by the next users and end-users.

For the bundled solutions to be widely adopted and have the greatest possible impact on sustainably bridging yield gaps, a capacity development impact pathway that has the intermediate outcome **IO 3.02** of government, civil society including youth and women led groups, and private sector through business opportunities will scaling up the bundled solutions. By producing investment strategies, youth and gender sensitive business models, and training events (**O 3.09-3.11**), it is expected that the stated actors, but especially youth- and women-led organizations, will have the knowledge and practical capacity to work as service providers to farmers to help them adopt the bundled solutions in their communities because this would be a profitable line of work with positive contributions to the community and the environment. As an example, the EiA Use Case of Morocco to promote conservation agriculture on 1 million hectares by the next decade is a challenging innovation as a bundled solution in the CWANA region that needs to be supported by the main national stakeholders. This model could be scaled to other countries in the region. The assumptions are (5) that these investment strategies and business models are workable and profitable

with demonstrated demand from farmers and other stakeholders; and (6) that youth and women led groups are (en)able(d) to participate in the process. The risks are that the investment strategies and business models are not in fact workable and profitable, and/or that a diverse set of stakeholders, especially youth and women, are not able to participate easily in the process.

Annex of Partners [here](#).

### 3.2.4 Work package 4 research plans and ToC: Integrated food, land, water and energy systems for resilient landscapes

Work Package title	<b>Integrated food, land, water and energy systems for climate-resilient landscapes</b>
Work Package main focus and prioritization	WP4 will support communities and stakeholders for more sustainable, resilient and inclusive water, energy and landscape management policies, design and practices at the regional, national, and landscape scales. Activities focus on i) diagnostics to clarify limits to growth and improve the long-term potential for sustainable livelihoods; ii) foundations for scaling up access to alternative water resources, including water recycling and re-use; iii) integrated approaches to storing more water in natural and built systems at multiple scales, and increasing the productivity and value of that water and land; iv) maintaining productivity in saline landscapes; and iv) strengthening inclusive policies and governance for integrated management across the food-land-water-energy nexus.
Work Package geographic scope	1-CWANA region: EG-Egypt, LB-Lebanon, MA-Morocco, SD-Sudan, UZ-Uzbekistan

#### The science:

Research questions	Scientific methods	Key outputs
<b>RQ 4.01</b> What is the current and long-term potential and extent for sustainable livelihoods at the landscape scale (basin and country) within a climate change context?	<p>Diagnostics to clarify limits to growth and improve the long-term potential for sustainable livelihoods through:</p> <p>Natural resource mapping and analysis largely derived from remote sensing global and regional data.</p> <p>Use of Water Accounting tool such as WA+.</p>	<p><b>O 4.01</b> The state of water and landscapes analysed.</p> <p><b>O 4.02</b> Web-based dashboard of national and key basin water accounts developed.</p> <p><b>O 4.03</b> Capacity of intended users of web-based dashboard (policy makers) built.</p> <p><b>O 4.04</b> Gender responsive community management plan</p>

	<p>Use of Solar Suitability tool.</p> <p>Use of socio-economic qualitative analysis.</p> <p>Coding and web development to make tools and data accessible to stakeholders through web-based dashboard.</p> <p>Decision- making tools on WEF Nexus (Q-Nexus Web Tool) for multi-sectoral coordinated planning.</p>	for the sustainable use of natural resources in fragile and conflict affected situations developed.
<p><b>RQ 4.02</b> How can beyond water (Nexus: water-energy-food (Nexus-WEF)) governance be improved to strengthen resilience of food, land and water systems and improve productivity at country and basin level?</p>	<p>Strengthening inclusive policies and governance beyond water for integrated management across the food-land-water-energy nexus through:</p> <p>Socioeconomic data analysis.</p> <p>Water governance analysis in piloting countries.</p> <p>Policy mapping and analysis.</p> <p>Qualitative analysis.</p> <p>Multi-stakeholders dialogue.</p>	<p><b>O 4.05</b> Holistic integrated Nexus governance guidelines and framework developed.</p> <p><b>O 4.06</b> Investment strategies to strengthen the resilience of food, land, water and energy systems developed.</p> <p><b>O 4.07</b> Evidence-based policy advice for Nexus-reuse and shared resources between competing sectors developed.</p> <p><b>O 4.08</b> Guidelines for co-designing Nexus decision-support tools developed.</p> <p><b>O 4.09</b> Management factsheets about the Nexus inputs and outputs process and benefits.</p> <p><b>O 4.10</b> Multi-actor and sector partnerships and services for Nexus-WEF in stable and fragile contexts set up.</p>
<p><b>RQ 4.03</b> How can water productivity be improved through water recycling and re-use at country and regional/watershed scale?</p>	<p>Establishing the foundations for scaling up access to alternative water resources, including water recycling and re-use to improve water productivity, at country and watershed level through:</p>	<p><b>O 4.11</b> Cost-benefit of treated wastewater (TWW) reuse in marginal communities developed.</p>

	<p>Water accounting and assessment analysis.</p> <p>Gender mainstreaming and circular economy analysis.</p> <p>Experimentation site for treated wastewater (TWW) reuse, irrigation systems, practices, crops, etc.</p> <p>Policy mapping and analysis, survey and quantitative methods including economic cost benefit analysis, and qualitative analysis methods.</p> <p>Multi-stakeholder dialogue.</p>	<p><b>O 4.12</b> TWW reuse and substitution materials developed.</p>
<p><b>RQ 4.04</b> How can water availability and reliability be sustainably improved through integrated water storage management at country and basin/watershed levels?</p>	<p>Designing and facilitating integrated approaches to storing more water in natural and built systems at multiple scales, and increasing the productivity and value of that water through:</p> <p>Remote sensing.</p> <p>Integrated hydrological modelling.</p> <p>Socioeconomic data analysis and feasibility study.</p> <p>Policy mapping and analysis.</p> <p>Qualitative analysis.</p> <p>Experiment site for piloting and monitoring.</p> <p>Multi-stakeholders dialogue.</p>	<p><b>O 4.13</b> Water storage diagnostics based on NEXUS Gains methodology produced.</p> <p><b>O 4.14</b> Capacity of Government and private sector built through multi-stakeholder dialogue events.</p>
<p><b>RQ 4.05</b> How can the productivity of marginal and saline landscapes be maintained</p>	<p>Maintaining and improving productivity in marginal and saline landscapes through:</p>	<p><b>O 4.15</b> Marginal and saline landscapes management demonstrated and roadmap for countries developed.</p>



or improved at watershed and country level?	<p>Remote sensing, and integrated hydrological modelling.</p> <p>Valuation of soil retention.</p> <p>Socioeconomic data analysis.</p> <p>Policy mapping and analysis.</p> <p>Qualitative analysis.</p> <p>Multi-stakeholders dialogue.</p> <p>Monitoring and evaluation.</p>	<p><b>O 4.16</b> Guidelines on the integration and scaling up of aquaculture (fish farming) and agriculture developed.</p> <p><b>O 4.17</b> Investment strategy for gender sensitive scaling up of integrated Nexus farming systems developed.</p> <p><b>O 4.18</b> Capacity of Government, private sector and civil society built through multi-stakeholder dialogue events.</p>
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## Work Package 4: Integrated food, land, water and energy systems for climate resilient landscapes.



## The Theory of Change:

Work Package 4 will work towards achieving **EoIO 5**, that government, civil society and private sector practice the integrated management of food, land, water and energy systems through a policy impact pathway, and a capacity development impact pathway. The policy impact pathway works towards **IO 4.01** where government develops policy for the integrated management of these systems. It does this, initially, by gathering high quality data from across these sectors (with inputs from ClimBeR) and brings this together with analytical tools into an easy-to-use, accessible, web-based dashboard that can be used by policymakers to help understand complex, cross-sectoral, and often competing issues, and supporting decision-making that leads to the integrated management of food, land, water, and energy systems (**O 4.01-4.03**). Secondly, the governance of the water-energy-food nexus will be addressed, with inputs from NEXUS Gains, through the NAS and the NIPs (O 1.01 and 1.09, both housed in WP1) with a series of outputs such as Nexus governance guidelines, investment strategies, decision support tools, and partnerships (**O 4.05-4.10**) that are designed to be used by policymakers to support their decision-making process. The assumptions are that (1) policy makers will be motivated to work more collaboratively across sectors when they have easy to use tools that address the complex and competing issues they face, and (2) and provide a framework for Nexus governance. The risks are that policy makers are not motivated to work collaboratively across sectors.

This capacity development impact pathway feeds into the **EoIO 5** via two intermediate outcomes. The first is that government and private sector actors have the capacity to manage water scarcity and variability, which we aim to achieve through producing outputs related to treated waste-water recycling and reuse (**O 4.11-4.12**), and water storage management (**O 4.13-4.1**). We assume that through these outputs, the stated actors will have the knowledge and capacity to manage water scarcity and variability, which (3) they will put into action to manage these critical issues in communities across CWANA facing extreme water stress; and (4) that the Nexus thinking approach of the integrated management of food, land, water and energy systems will allow these actions to have the greatest effect at landscape scale. The risk is that these approaches are not put into practice.

The second IO in the capacity development impact pathway, **IO 4.03**, is that the same actors have the capacity to maintain and improve the productivity of marginal and saline landscapes, through using outputs produced by WP4 including marginal and saline landscapes management roadmaps, guidelines, investment strategies for gender-sensitive scaling, and capacity building events (**O 4.15-4.18**). We assume the same here as above (3), and (4).

The Innovations of WP4 are **Innovation 7: “Farm to Basin Smart Tools for Water Efficiency and Management”** (**O 4.01-4.03** and **4.11-4.18**) which will be co-delivered with WP5 (O 5.04, 5.06, 5.09-5.10), and **Innovation 8: “Toolbox of Nature-based Solutions for People and Planet”** (**O 4.11-4.12** and **O 4.15-4.16**). The development, testing and scaling readiness of these innovations will be done through the NAS and the NIPs.

Annex of Partners [here](#).

### 3.2.5 Work package 5 research plans and ToC: Scaling innovations and digital tools for climate-resilient food value chains

Work Package 5 title	<b>Scaling innovation and digital tools for climate-resilient food value chains</b>
Work Package main focus and prioritization	This work package focuses on accelerating and scaling digital climate services, financial solutions and other technologies resulting from this initiative that improves the climate resilience of food value chains (FVCs). Producers, especially smallholder farmers, often lack access to adequate climate risks information management tools and services are rarely scaled due to the lack of a conducive environment and lack of private sector participation. CWANA lags in its investment in digital infrastructure and lacks the enabling environment to support agricultural innovations. WP 5 seeks to leverage, assess, accelerate, and scale the use of digitally innovative solutions to address climate change induced challenges across FVCs.
Work Package geographic scope	1-CWANA region: EG-Egypt, LB-Lebanon, MA-Morocco, SD-Sudan, UZ-Uzbekistan

#### The science:

Research questions	Scientific methods	Key outputs
<b>RQ 5.01</b> What climate information data and services do agricultural food value chain (FVC) actors need to manage climate risks in the CWANA region?	<p>Screening of available climate risk data such as droughts, floods, extreme temperatures, changing rainfall variability already accessible through government agencies or service providers.</p> <p>Focus group discussions, key informant interviews and Delphi studies to understand the climate information systems data needs and the type of service provision of FVC components.</p> <p>Develop climate information services framework that capture the needs for data for FVC actors.</p> <p>Develop, test and trial with the Innovation Platforms set under WP1 key climate/weather data</p>	<p><b>O 5.01</b> Climate information service needs, provision of key actors and new data generation tools.</p> <p><b>O 5.02</b> Web-based platform for climate analysis and early warning system.</p> <p><b>O 5.03</b> Climate of National Innovation Platforms (NIPs) characterised using web-based platform.</p>

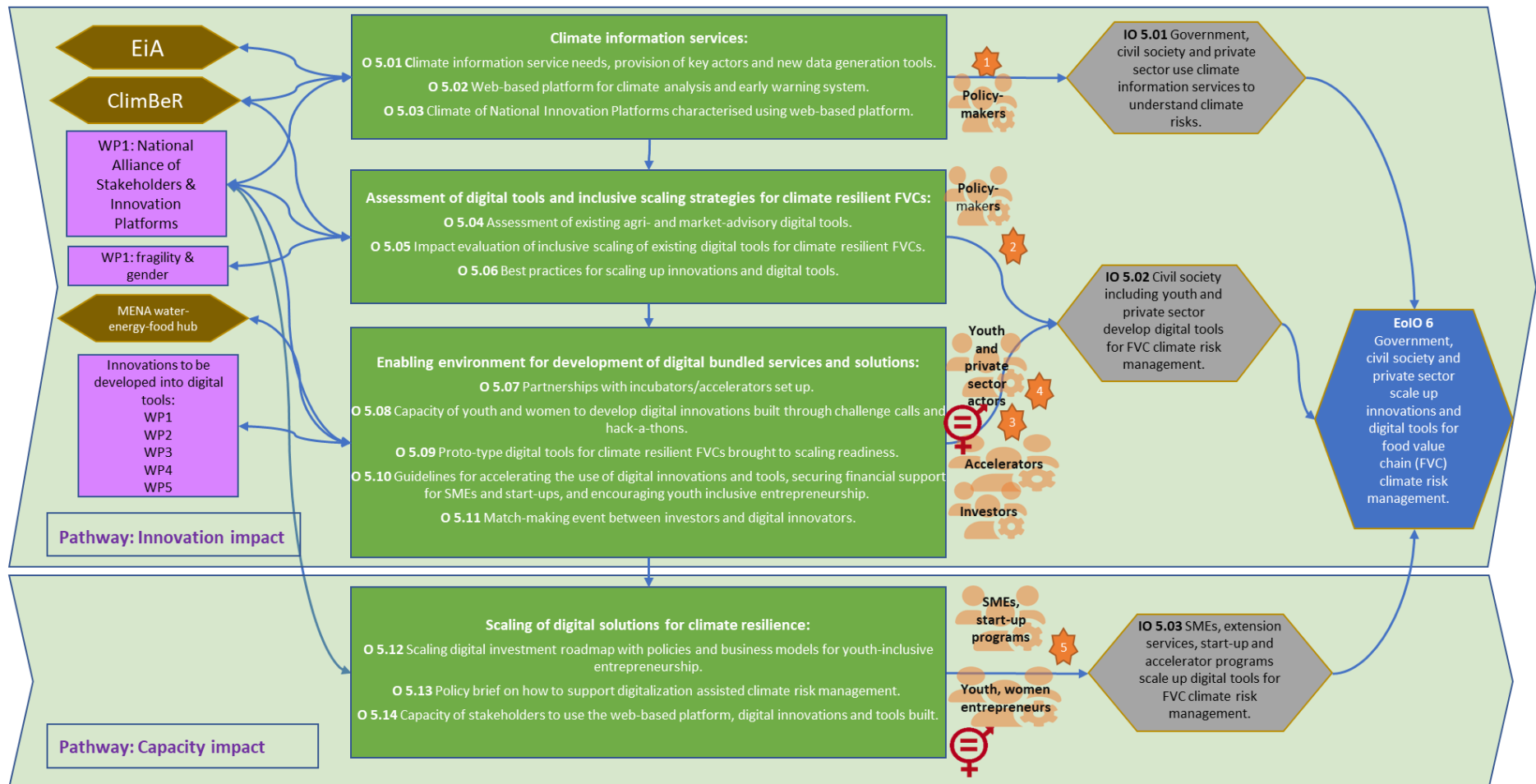
	<p>generation tools such as seasonal forecasting, drought and flood alerts, rainfall deficit across the growing season developed using primary and secondary earth observation data for main climate extremes and associated risk variables.</p> <p>Dialogue and engagements with key government agencies (e.g. meteorological agencies) and private sector providers.</p>	
<p><b>RQ 5.02</b> How can agri- and market-advisory scaling up strategies for climate-resilient FVCs be socially inclusive, effective and sustainable?</p>	<p>Scoping review of existing agri- and market-advisory digital services and tools and how they might bring inclusivity.</p> <p>Impact evaluation of the previous scaling successes and failures of services and solutions resulting from factors such as policies, institutions, regulatory frameworks and Public Private Partnerships (PPPs).</p> <p>Field survey, scoping missions, interviews with experts and policy consultations.</p>	<p><b>O 5.04</b> Assessment of existing agri- and market-advisory digital tools.</p> <p><b>O 5.05</b> Impact evaluation of inclusive scaling of existing digital tools for climate-resilient FVCs.</p> <p><b>O 5.06</b> Best practices for scaling up innovations and digital tools.</p>
<p><b>RQ 5.03</b> How can the enabling environment for the efficient and inclusive adoption of the best digital agri-climatic digital bundled services and solutions be improved to accelerate scaling?</p>	<p>Partner with selected incubator/accelerator programs (i.e. the MENA Water-Energy for Food (WEF) Hub<sup>xlv</sup>) to offer training to youth agri-entrepreneurs to co-develop and build a pipeline of digital solutions (integrating CGIAR science) for climate risk management through challenge calls and hack-a-thons.</p> <p>Bring growth finance to selected innovators on digital climate risk management solutions by co-</p>	<p><b>O 5.07</b> Partnerships with incubators/accelerators set up.</p> <p><b>O 5.08</b> Capacity of youth/women to develop digital innovations built through challenge calls and hack-a-thons.</p> <p><b>O 5.09</b> Proto-type digital tools for climate-resilient FVCs brought to scaling readiness.</p> <p><b>O 5.10</b> Guidelines for accelerating the use of digital</p>

<sup>xlv</sup> MENA Water-Energy for Food (WEF) Hub: <https://we4f.org/mena>

	<p>designing and co-leading matchmaking events with national, regional and global investors.</p> <p>Co-design and co-demonstrate two selected Innovation Packages using the Reach-Benefit-Empower-Transform (RBET) Framework<sup>xlvi</sup> and through the WE4F Hub and living labs within Innovation Platforms to build digital inclusion.</p>	<p>innovations and tools, securing financial support for SMEs and start-ups, and encouraging youth inclusive entrepreneurship.</p> <p><b>O 5.11</b> Match-making event between investors and digital innovators.</p>
<p><b>RQ 5.04</b> How can digital innovations that support the creation of climate-resilient FVCs be scaled out for maximum durable impact?</p>	<p>Co-design and co-demonstrate with Governments, IFIs &amp; MDBs, development partners a scaling investment roadmap for digital innovation towards climate resilience value chain in empowering youth entrepreneurship, accelerator grants for SMEs, incubators.</p> <p>Capacity building of different actors on the use of climate smart digital technologies and advisory services for strengthening FVCs.</p>	<p><b>O 5.12</b> Scaling digital investment roadmap with policies and business models for youth-inclusive entrepreneurship.</p> <p><b>O 5.13</b> Policy brief on how to support digitalization assisted climate risk management.</p> <p><b>O 5.14</b> Capacity of stakeholders to use the digital innovations and tools built.</p>

<sup>xlvi</sup> <https://gender.cgiar.org/tools-methods-manuals/reach-benefit-empower-transform-rbet-framework>

## Work Package 5: Scaling innovations and digital tools for climate resilient food value chains.





## The Theory of Change:

Work Package 5 aims to achieve **EoIO 6**, that government, civil society and private sector scale up innovations and digital tools for food value chains (FVCs) climate risk management via an innovation impact pathway and a capacity development impact pathway. The Innovation impact pathway feeds into **EoIO 6** via two intermediate outcomes. The first is **IO 5.01**, that the government, civil society and private sector use climate information services to understand climate risks, which will be achieved by increasing availability of climate information required for local needs, producing a web-based platform for climate analysis that can become part of an early warning system, and capacity development activities for users (**O 5.01-5.03** and **O 5.14**). The assumptions here are that (1) up to date, informative and easy to use digital tools to provide a climate information service will be used to better understand the climate and climate risks for their location. The risk is that the tools developed are not sufficient for the partners' needs, easy to use, or are somehow inaccessible.

The second is **IO 5.02**, that civil society including youth, and private sector develop digital tools for FVC climate risk management, which we will achieve through two related areas of work. The first is about assessing existing digital tools for agri- and market-advisory services and scaling up strategies and developing best practices for both that will facilitate to greatest social inclusion, especially of women, youth, and other disadvantaged social groups (**O 5.04-5.06**). The assumption here is (2) that by understanding what has been done previously, we can innovate on the process to be more effective when it comes to developing and scaling new innovations and digital tools. The second area working towards **IO 5.02** is enabling environment for the development of digital tools for FVC climate risk management, where we will set up partnerships with incubators/accelerators, develop the capacity of youth and women to create digital tools, and develop guidelines for scaling (**O 5.07-5.11**). The kinds of prototype digital tools developed will be informed by the innovations and bundled solutions developed in F2R-CWANA Work Packages, from other Initiatives and private sector. The assumption here is (3) that we will be able to get the right people and organisations, and (4) that by facilitating the creation of these partnerships and trainings, we will create a conducive – creative, innovative, thriving - environment for the capacity development of individuals, civil society organisations, and private sector in the development of digital tools.

The capacity development impact pathway contributes to the **EoIO 6** via **IO 5.03**, that SMEs, extension services, start-up and accelerator programs scale up digital tools for FVC climate risk management. We will achieve this through producing roadmaps for investing in digital scaling, youth-inclusive business models, and capacity building of stakeholders to use the digital innovations and tools (**O 5.12-5.14**). The assumptions here are (5) that the roadmaps, business models, will be financially attractive and readily adopted by the stated partners.

The WP5 innovations are **Innovation 7: Farm to Basin Smart Tools for Water Efficiency and Management** (**O 5.04, 5.06, 5.09-5.10**) which will be co-delivered with WP4 (**O 4.01-4.03** and **4.11-4.18**) and **Innovation 9: Weather Station Based Irrigation and Advisory System** (**O 5.01-5.02, 5.04, 5.06, 5.13-5.14**).

## 4. Innovation Packages and Scaling Readiness Plan

### 4.1 Innovation Packages and Scaling Readiness Plan

The Innovation Packages and Scaling Readiness work will be housed within F2R-CWANA initiative WP1 where there are the Innovation Platforms, National Alliance of Stakeholders, and a Scaling Readiness expert. The Initiative will conduct scaling readiness assessments for nine core innovations of the initiative (Table 3, selected from 75 “Golden Egg” innovations); work with innovations coming from across the CGIAR portfolio to be scaled in CWANA (e.g. EiA, ClimBeR, Cities, Digital Technologies, Genebank, Plant Health, ABI, MIPP, NEXUS Gains); monitor changes in the scaling readiness of the innovations; identify CWANA-specific bottlenecks for scaling and develop strategies to overcome these; design innovation-specific Scaling Strategies with partners; facilitate country and regional scaling and innovation networks; and by the end of the business cycle be in a position to implement the management of a portfolio of Innovation Packages.

F2R-CWANA will aim for the Second Wave Scaling Backstopping commencing with the Light Track (develop capacity, define scaling ambition, detail a roadmap) in Q2-2023 (bus 2) for five of the Core Innovation. In year 3 the remaining four Core Innovations will go through the Light Track. For innovations that have gone through the Light Track (aiming for at least 5 of the 9 Core Innovations), the Standard Track process (design innovation packages, conduct scaling readiness assessments, design scaling strategies) will begin in Q1 of 2024. By the end of the three-year Initiative period, we expect to be able to implement the Advanced Track in the beginning of the next business cycle as this can only start once more than 50% of the Initiative innovation portfolio has been through the Standard Track. The initiative has allocated USD 630,000 to implement the Innovation Packages and Scaling Readiness Plan (2022: USD 320,000; 2023: USD 210,000; and 2024: USD 100,000). Dedicated activities, deliverables, indicators, and line-items are included in the MELIA, Management Plan and Budget Sections.

**Table 3.** Summary of the nine selected F2R-CWANA Core Innovations.

Innovation #	Innovation name	Linked to Outputs (O)
1	Rural Investment and Policy Analysis (RIAPA) Modelling Toolkit	1.03-1.05
2	CGIAR Innovation Accelerator and Open Innovation Platform	1.09-1.13
3	Participatory Product Profile Performances	2.01-2.07
4	In-situ Conservation of CWANA Dryland Agrobiodiversity	2.13-2.17
5	Scale-appropriate Mechanization	3.05
6	Resilient Food and Feed Crops	3.07-3.08
7	Farm to Basin Smart Tools for Water Efficiency and Management	4.01-4.03, 4.11-4.18, 5.04, 5.06, 5.09-5.10
8	Toolbox of Nature-based Solutions for People and Planet	4.11-4.12, 4.15-4.16
9	Weather Station-based Irrigation and Advisory System	5.01-5.02, 5.04, 5.06, 5.13-5.14

**Table 4.** Summary of the expected number of Innovation Packages and Scaling Readiness Tracks that F2R-CWANA is expecting to conduct during the 3-year life of the Initiative.

Scaling track	Year 1	Year 2	Year 3
Light Track		5	4
Standard Track			5
Advance Track			

Annex for section 4.1 Innovation Packages and Scaling Readiness Plan [here](#).

## 5. Impact statements

### 5.1 Nutrition, health and food security

#### **Challenges and prioritization**

The CWANA region has fragile agrifood systems which limits access to healthy diets and increases the double burden of malnutrition. Climate change, COVID-19, conflict, and policy fragmentation, compound malnutrition and food insecurity challenges while the growing regional population presents additional imbalances between food demand and food production. Addressing these challenges necessitate transformation in agrifood systems. WP1 identifies new pathways, innovations, policy priorities and institutional arrangements for agrifood systems transformation in CWANA to address the above. WP2 contributes to biodiversity conservation and diffusion of genetic innovations including validation of nutritional and household/industrial end-use quality that contribute to improve food and nutrition security as well as improving marketability in CWANA. WP3 facilitates sustainable intensification of farming systems in CWANA while WP4 supports communities and stakeholders for more sustainable, resilient, and inclusive water, land and agrifood systems. WP5 will help improve climate resilience of food value chains (FVCs) by promoting and scaling-up of digital technologies, to improve access and affordability of healthy diets in the region.

#### **Components of Work Packages (WPs)**

WP	Research questions	Outputs	Outcomes	3-year targets and metrics
1	1.01, 1.04	1.01, 1.02, 1.03, 1.04, 1.05, 1.09, 1.10, 1.11, 1.12, 1.13	IO 1.01, IO 1.02, EoIO 1	<b>EoIO 1</b> Government, civil society, private sector and INGOs jointly develop strategies and policies to create more efficient, inclusive and resilient national agrifood systems. → 5 policies, strategies, laws, regulations, budgets, investments modified in design or implementation, informed by CGIAR research, in EG, LB, MA, SD, UZ by 2025.
2	2.01, 2.04	2.01, 2.02, 2.03, 2.04, 2.05, 2.06, 2.07	IO 2.01, IO 2.02, IO 2.05, EoIO 2	<b>EoIO 2</b> Farmers use Best Bet Genetic Innovations developed for CWANA. → 2% of beneficiaries using the innovation, disaggregated by gender in EG, LB, MA, SD, UZ by 2025.

3	3.03	3.08, 3.09		
4				
5				

### Partners

Please see the Annex of Partners [here](#).

### Human resources and capacity development

Team includes agrobiodiversity specialists (taxonomist/on-farm conservationist), specialist in FAP, plant breeders, seed systems and product specialists, as well as socio-economists and policy analysis as well as data management and analysts as well as data modelers and gender and social inclusion specialists. Key capacity development with NARS partners and on-the-ground stakeholders will be critical.

## 5.2 Poverty reduction, livelihoods and jobs

### Challenges and prioritization

According to World Bank indicators<sup>xlvi</sup>, the multidimensional poverty headcount ratio (% of population) in CWANA ranges between 4.7% for Egypt (2014) to 51.4% for Sudan (2017). Despite rural population-dependence on agriculture, agriculture and rural development is declining. Additionally, the region is facing several converging trends threatening future livelihoods of the poorest with less access to resources and basic services, typically people living in conflict-affected regions, marginal farmers, farm laborers, and women and children. Studies have confirmed high poverty and unemployment levels regionally, but few case studies demonstrated that agricultural innovations can contribute to improve livelihood security, raise incomes and reduce poverty in efficient and inclusive ways. This Initiative targets ways to increase opportunities for farmers with focus on women and youth, and conflict-affected populations (e.g., inclusive business models, fast tracking adoption mechanisms) over identification and promotion of technological innovation packages leading to increase farm profitability and achieving decent jobs.

### Components of Work Packages (WPs)

WP	Research questions	Outputs	Outcomes	3-year targets and metrics
1				
2	2.01	2.08, 2.09, 2.10, 2.11	IO 2.04	
3	3.04	3.10, 3.11, 3.12	IO 3.02	
4	4.01	4.01, 4.02, 4.03, 4.04	IO 4.01	
5	5.04	5.12, 5.13, 5.14	IO 5.03	

### Partners

<sup>xlvi</sup> <https://databank.worldbank.org/source/world-development-indicators>

Please see the Annex of Partners [here](#).

### **Human resources and capacity development**

Team includes socio-economists, policy analysts, while being underpinned by gender and social inclusion, and fragility specialists, as well as agricultural innovation and scaling specialists, data modelers and data science and GIS specialists. This WP also has a strong capacity development component in policy support and development and digital application.

## 5.3 Gender equality, youth and social inclusion

### **Challenges and prioritization**

The CWANA region is experiencing increased managerial and labour feminization in agriculture and yet has limited access to inputs, information, land rights and technologies for women, youth, internally displaced people, and minority groups. The increased feminization of farming has been associated with low agricultural productivity, low earnings, poor job security and growing food insecurity. F2R-CWANA builds on the premise that addressing these deficiencies offers key entry points to support the empowerment of women – who are set-back by gender norms. To leverage the empowerment potential of women we propose to understand the interaction between technologies, policies, social and biophysical dynamics and local gender dynamics and norms. Based on this learning we will co-design and test gender-transformative approaches that are effective to address these norms and support the creation and adoption of innovations relevant at a country-specific level.

### **Components of Work Packages (WPs)**

WP	Research questions	Outputs	Outcomes	3-year targets and metrics
1	1.03	1.06, 1.07, 1.08	IO 1.03	
2				
3				
4				
5	5.03	5.07, 5.08, 5.09, 5.10, 5.11	IO 5.02	

### **Partners**

Please see the Annex of Partners [here](#).

### **Human resources and capacity development**

Team includes socio-economists, policy analysts, integrated water resources management specialists, as well as water governance and water management, as well as water accounting team, and underpinned by gender and inclusion specialists with a clear inclusion of junior specialists. Capacity development critical to support web-based platforms for sharing information and innovations.

## 5.4 Climate adaptation and mitigation

### **Challenges and prioritization**

Although a 2°C warming scenario is expected at the global scale, for CWANA - already the world's hottest and driest region - a 4°C warming by the end of the century seems more likely. CWANA region uses a greater share of water resources for food production than any other region, and water scarcity will be exacerbated by climate change. This Initiative is built on the premise of the need for active and rapid management and mitigation of in-coming climate challenges to help prevent against increased desertification, water scarcity, and social instability which is prevalent in the region and is a challenge to achieving long term positive impact.

#### Components of Work Packages (WPs)

WP	Research questions	Outputs	Outcomes	3-year targets and metrics
1				
2				
3				
4				
5	5.01, 5.02	5.01, 5.02, 5.03, 5.04, 5.05, 5.06	IO 5.01, EoIO 6	<b>EoIO 6</b> Government, civil society and private sector scale up innovations and digital tools for food value chain (FVC) climate risk management. → 25 beneficiaries (organisations) using the innovations in EG, LB, MA, SD, UZ by 2025.

#### Partners

Please see the Annex of Partners [here](#).

#### Human resources and capacity development

Team includes socio-economists, policy analysts, agrobiodiversity specialists, soil specialists, as well as breeders and seed system and product management, and underpinned by gender and inclusion specialists as well as incubator specialists and sustainable finance experts to support matchmaking in the region. Additionally, GIS and data modelling will form a critical part. Capacity development will be included in web-based and digital platforms, SMEs and support to youth-inclusive entrepreneurship.

## 5.5 Environmental health and biodiversity

### Challenges and prioritization

CWANA encompasses four major centers of diversity (Mediterranean, Abyssinian, Fertile Crescent, and Central Asia) for crops and forage species of global and regional importance. Agriculture remains the major activity of rural communities and a pillar in national economies. However, agriculture production is increasingly affected by adverse effects of land degradation, water scarcity and climate change. This leads to more degraded environments and farmers being forced to abandon their lands, livestock and crops. Substantial gaps in productivity exist in farming systems which calls for well-coordinated efforts to transfer the already existing technologies to farmers. Additional substantial productivity gains are possible through an integrated approach to ensure sustainable intensification and diversification of the predominant farming systems. An integrated and innovative approach combining technological, institutional and policy options and involving key stakeholders including youth and gender is required

to reduce gaps in productivity and to contribute to development of packages for ensure sustainable agricultural development.

### Components of Work Packages (WPs)

WP	Research / Activities	Outputs	Outcomes	3-year targets and metrics
1				
2	2.03	2.12, 2.13, 2.14, 2.15, 2.16, 2.17	EoIO 3	<b>EoIO 3</b> Farmers acquire knowledge and capacity on best practices for the on-farm conservation of agrobiodiversity. → Change in the capacity of 5,000 key individuals in LB, MA, UZ by 2025.
3	3.01	3.01, 3.02, 3.03, 3.04, 3.05, 3.06, 3.07	IO 3.01, EoIO 4	<b>EoIO 4</b> Government, civil society and private sector scale up bundled solutions to decompose yield gaps. → Change in the capacity of individuals in 50 key organisations EG, LB, MA, SD, UZ by 2025.
4	4.02, 4.03, 4.04, 4.05	4.05, 4.06, 4.07, 4.08, 4.09, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18	IO 4.01, IO 4.02, IO 4.03, EoIO 5	<b>EoIO 5</b> Government, private sector and civil society put into practice the integrated management of food, land, water and energy systems. → 15 policies, strategies, budgets, investments modified in design or implementation, informed by CGIAR research in EG, LB, MA, SD, UZ by 2025.
5				

### Partners

Please see the Annex of Partners [here](#).

### Human resources and capacity development

Team includes agrobiodiversity specialists, plant breeders, seed system and product management specialists, cropping modeler, as well as mechanization and geospatial and data scientists and policy specialists. Additionally, integrated water resource management, water governance, treated wastewater, and salinity specialists. These specialists will undertake significant capacity development and support alongside stakeholders.

## 6. Monitoring, Evaluation, Learning and Impact Assessment



## 6.1 Result Framework

CGIAR Impact Areas				
Nutrition, health and food security	Poverty reduction, livelihoods and jobs	Gender equality, youth and social inclusion	Climate adaptation and mitigation	Environmental health and biodiversity
Collective global 2030 targets				
End hunger for all and enable affordable healthy diets for the 3 billion people who do not currently have access to safe and nutritious food.	<p>Lift at least 500 million people living in rural areas above the extreme poverty line of US \$1.90 per day (2011 PPP).</p> <p>Reduce by at least half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.</p>	<p>Close the gender gap in rights to economic resources, access to ownership and control over land and natural resources for over 500 million women who work in food, land and water systems.</p> <p>Offer rewardable opportunities to 267 million young people who are not in employment, education or training.</p>	Equip 500 million small-scale producers to be more resilient to climate shocks, with climate adaptation solutions available through national innovation systems.	<p>Stay within planetary and regional environmental boundaries: consumptive water use in food production of less than 2500 km<sup>3</sup> per year (with a focus on the most stressed basins), zero net deforestation, nitrogen application of 90 Tg per year (with a redistribution towards low-input farming system) and increased use efficiency; and phosphorus application of 10 Tg per year.</p> <p>Maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed genebanks at the national, regional, and international levels.</p>
Common impact indicators				
#people benefiting from relevant CGIAR innovations	#people benefiting from relevant CGIAR innovations	<p>#women benefiting from relevant CGIAR innovations</p> <p>#youth benefiting from relevant CGIAR innovations</p>	#people benefiting from climate-adapted innovations	<p>#ha under improved management</p> <p>#km<sup>3</sup> consumptive water use</p> <p>#plant genetic accessions available and safely duplicated</p>
SDG Targets				
2.4, 2.5	1.5, 1.b, 8.2, 8.3, 8.6, 8.10	5.5, 5.b, 5.c, 16.7	13.1, 13.2, 13.3, 13.b	6.3, 6.4, 6.5, 6.a, 6.b, 12.2, 12.a, 15.5, 15.6

Action Area: Resilient Agrifood Systems											
Resilient Agrifood Systems Action Area outcomes						Resilient Agrifood Systems Action Area outcome indicators					
RAFS 1 NARES and Regional Agricultural Research Institutes develop farming system innovations with the potential to increase the food security of smallholders in targeted areas.						RAFSi 1.1 Number of resource-efficient and climate-smart technologies at stage IV (uptake by next user), disaggregated by type.					
ST & RAFS 1 National and local multi-stakeholder platforms are strengthened to become functional and sustainable in addressing development tradeoffs and generating strategies for effective food, land, and water transformation.						STRAFSi 1.1 Number of smallholder farmers who have implemented new practices that mitigate climate change risks, disaggregated by gender and type of practice.					
ST & RAFS 2 Global funding agencies and national governments use research evidence in the development of strategies, policies, and investments to drive sustainable transformation of food, land, and water systems to meet multiple CGIAR impact area targets.						STRAFSi 2.1 Number of policies/ strategies/ laws/ regulations/ budgets/ investments/ curricula (and similar) at different scales that were modified in design or implementation, with evidence that the change was informed by CGIAR research.					
ST & RAFS & GI 1 CGIAR partners develop and scale innovations that contribute to the empowerment of women, youth, and other social groups in food, land, and water systems.						STRAFSGli 1.2 Number of women, youth and people from marginalized groups who report input into productive decisions, ownership of assets, access to and decisions on credit, control over use of income, work balance, and visiting important locations.					
Initiative and Work package outcomes, outputs and indicators											
Result type (outcome or output)	Result	Indicator	Unit of measurement	Geographic scope	Data source	Data collection method	Frequency of *data collection	Baseline value (outcome only)	Baseline year (outcome only)	Target value	Target year
Outcome	EoIO 1 Government, civil society, private sector and INGOs jointly develop strategies and policies to create more efficient, inclusive, and resilient national agrifood systems.	Number of policies, strategies, laws, regulations, budgets, investments modified in design or implementation, informed	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews, stakeholder consultations	Annual	Not available	Not available	5	2025

		by CGIAR research									
Outcome	<b>IO 1.01</b> Government, civil society, private sector and INGOs form strategic partnerships to make national agrifood systems more efficient, inclusive and resilient.	Change in the capacity of key networks	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews, stakeholder consultations	Annual	Not available	Not available	5	2025
Output	<b>O 1.01</b> National Alliances of Stakeholders created and/or strengthened.	Number of Alliances of Stakeholders created	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews, stakeholder consultations	Annual			5	2022
Output	<b>O 1.02</b> Policy, regulatory, institutional and investment constraints and opportunities for agrifood systems transformation analysed.	Number of other information products (report, briefs)	Number	LB, SD, UZ,	Primary	CGIAR and other data repositories	Semi-annual			7	2023
Output	<b>O 1.03</b> Technology and service provision innovations analysed for their potential to transform agrifood systems.	Number of other information products (report)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024

Outcome	<b>IO 1.02</b> Government, civil society, private sector and INGOs know how to best support durable development impacts in fragile and conflict-affected situations.	Change in the capacity of key organizations	Number	LB, SD	Primary	Key informant interviews, stakeholder consultations	Annual			10	2025
Output	<b>O 1.04</b> Investments in capacity, institutions and infrastructure for durable development impacts in fragile and conflict-affected contexts recommended.	Number of other information products (briefs)	Number	LB, SD	Primary	CGIAR and other data repositories	Semi-annual			2	2024
Output	<b>O 1.05</b> Technology adoption and sustainable resource use in fragile and conflict-affected contexts analysed.	Number of other information products (reports)	Number	LB, SD	Primary	CGIAR and other data repositories	Semi-annual			2	2023
Outcome	<b>IO 1.03</b> Government, civil society, private sector and INGOs know how to best support the empowerment of women and other disadvantaged social groups.	Change in the capacity of key organizations	Number	LB, MA	Primary	Key informant interviews, stakeholder consultations	Annual	Not available	Not available	8	2025

Output	<b>O 1.06</b> GTAs that lead to equitable access to outputs, technology design, employment, and inputs.	Number of other information products (report)	Number	LB, MA	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 1.07</b> Women's empowerment using GAAs and GTAs.	Number of other information products (report)	Number	LB, MA	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 1.08</b> Overcome intersectional marginalisation (gender intersecting with refugee status, age, class, and other social identities).	Number of other information products (report)	Number	LB, MA	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Outcome	<b>IO 1.04</b> Government, civil society, private sector and INGOs co-design and evaluate innovations and design scaling strategies to make national agrifood systems more efficient, inclusive and resilient.	Change in the capacity of key organizations	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews, stakeholder consultations	Annual	Not available	Not available	5	2025
Outputs	<b>O 1.09</b> National Innovation Platforms (NIPs)	Number of Innovation Platforms created	Number	EG, LB, MA, SD, UZ	Primary	Initiative Annual Report	Annual			5	2023

	created and/or strengthened.										
Output	<b>O 1.10</b> Development outcomes of innovations in institutional arrangements (public, private, or public-private partnerships) identified.	Number of other information products (briefs)	Number	MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2023
Output	<b>O 1.11</b> Farmers' bottlenecks and risks to innovate and adopt technology identified.	Number of other information products (brief)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2023
Output	<b>O 1.12</b> women's bottlenecks in agrifood value chains identified.	Number of other information products (report)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 1.13</b> Strategies to promote innovative technologies and service provisions in agrifood systems, with gender and youth differentiated impacts.	Number of other information products (report)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2023
Output	<b>IPSR O 1</b> CGIAR and partner capacity on	Number of selected Core	Number	EG, MA, UZ, SD, LB	Primary	Documented scaling ambition, vision of success	Annual			9	2025

	innovation and scaling strengthened (Light Track).	Innovation s for which scaling ambition, vision of success and roadmap have been co-created, agreed-upon and document ed.				and roadmap for use of Scaling Readiness					
Output	<b>IPSR O 2</b> Resource allocation, prioritisation and scaling strategy at Innovation Package level are evidence-based (Standard Track).	Number of Initiative Innovation Packages that have undergone evidence-based and quality controlled/ validated Scaling Readiness assessments informing innovation and scaling strategies.	Number	EG, MA, UZ, SD, LB	Primary	Scaling Readiness Assessment Study	Annual			5	2025
Outcome	<b>EoIO 2</b> Government supports and facilitates the use of Best Bet genetic innovations	Change in the capacity of key	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Stakeholder consultations	Annual	Not available	Not available	5	2025



	developed for CWANA	organisations									
Outcome	<b>IO 2.01</b> NARS add recommended advanced lines for release/registration to national portfolio of genetic innovations	Number of beneficiaries using the innovation, disaggregated by gender	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Stakeholder consultations	Annual	Not available	Not available	5	2025
Outcome	<b>IO 2.03</b> Farmers prefer climate smart varieties.	Change in the capacity of key individuals	Number	EG, LB, MA, SU, UZ	Primary	Knowledge, attitude & practice surveys	Annual	Not available	Not available	20,000	2025
Output	<b>O 2.01</b> Product Profiles for CWANA prioritised.	Number of other information products (report)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			5	2022
Output	<b>O 2.02</b> Performance of advanced lines during on-station assessment published.	Number of peer reviewed journal papers	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			1	2025
Output	<b>O 2.03</b> Performance of and gender trait preferences for advanced lines during on- and off-farm participatory assessment published.	Number of peer reviewed journal papers	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			1	2025

Output	<b>O 2.04</b> Farmers exposed to climate-smart varieties.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, LB, MA, SD, UZ	Primary	Demonstration and field days reports	Annual			10,000	2025
Output	<b>O 2.05</b> Full description of selected advanced lines recommended for country release/registration produced.	Number of other information products (report)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			5	2025
Output	<b>O 2.06</b> Germplasm of the selected advanced lines available for NARS release/registration process.	Number of innovations	Number	EG, LB, MA, SD, UZ	Primary	Initiative Annual Report	Annual			10	2025
Outcome	<b>IO 2.02</b> Global Genetic Innovation Initiatives develop Product Profiles that are specifically targeted to the requirements of stakeholders in CWANA.	Number of beneficiaries using the innovation, disaggregated by gender	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Stakeholder consultations	Annual	Not available	Not available	15	2025
Output	<b>O 2.07</b> Meetings with National Alliance of Stakeholders (NAS)	Number of people trained, long-term	Number	EG, LB, MA, SD, UZ	Primary	Meeting report	Annual			200	2025

	throughout the entire process.	and short-term, disaggregated by gender									
Outcome	<b>IO 2.04</b> Private sector and civil society, including women- and youth-led groups, use knowledge, genetic innovations and seed system business models.	Change in the capacity of key organisations	Number	EG, MA, SD, UZ	Primary	Key informant interviews; Focus group discussions; Stakeholder consultations	Annual	Not available	Not available	12	2025
Output	<b>O 2.08</b> Opportunities for seed system diversification identified.	Number of other information products (report, brief)	Number	EG	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 2.09</b> Demand creation for new Genetic Innovations.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, LB, MA, SD, UZ	Primary	Training event reports	Annual			3,750	2025
Output	<b>O 2.10</b> Business models for EGS production.	Number of other information products (report)	Number	EG, SU	Primary	CGIAR and other data repositories	Semi-annual			2	2023

Output	<b>O 2.11</b> Business models for the production of seed of less commercial crops through farmer-based seed producers.	Number of other information products (reports)	Number	MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 2.12</b> Seed sector business development trainings and workshops held with Government, private sector and civil society, including women- and youth-led organisations.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, MA, SD, UZ	Primary	Training event reports	Annual			50	2025
Outcome	<b>EOIO 3</b> Government supports and facilitates the on-farm and ex-situ conservation of agrobiodiversity in CWANA.	Change in the capacity of key organisations	Number	LB, MA, UZ	Primary	Key informant interviews; Stakeholder consultations	Annual	Not available	Not available	5	2025
Outcome	<b>IO 2.05</b> Farmers acquire knowledge and capacity on best practices for the on-farm conservation of agrobiodiversity.	Change in the capacity of key individuals	Number	LB, MA, UZ	Primary	Knowledge, skills, attitudes and practices survey	Annual	Not available	Not available	5,000	2025
Output	<b>O 2.13</b> Agrobiodiversity hotspots in	Number of other information products	Number	LB, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			7	2023

	CWANA identified and characterized.	(report, maps, other GIS outputs, data and databases)									
Output	<b>O 2.14</b> Accessions of endemic agrobiodiversity found in hotspots collected for conservation and use in genebanks.	Number of plant accessions input into Genebanks	Number	LB, MA, UZ	Primary	Initiative Annual Report	Annual			1,500	2024
Output	<b>O 2.15</b> Challenges and opportunities for the on-farm conservation of agrobiodiversity.	Number of other information products (report)	Number	LB, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2023
Output	<b>O 2.16</b> Management package for the on-farm conservation of agrobiodiversity.	Number of innovations	Number	LB, MA, UZ	Primary	Initiative Annual Report	Annual			3	2023
Output	<b>O 2.17</b> Training events for farmers on how to implement the on-farm agrobiodiversity conservation management plan.	Number of people trained, long-term and short-term, disaggregated by gender	Number	LB, MA, UZ	Primary	Training event report	Annual			150	2024

Outcome	<b>IO 2.06</b> Policymakers develop policies to support the conservation of genetic resources and accelerate the release and adoption of genetic innovations.	Number of policies modified in design or implementation, informed by CGIAR research	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Stakeholder consultations	Annual	Not available	Not available	5	2025
Output	<b>O 2.18</b> Policy reviews and recommendations for the release of Genetic Innovations, seed system diversification, and conservation of agrobiodiversity.	Number of other information products (report)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			7	2024
Output	<b>O 2.19</b> Engagement of policy makers and key stakeholders throughout process.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, LB, MA, SD, UZ	Primary	Engagement event report	Annual			50	2024
Outcome	<b>EOIO 4</b> Government, civil society and private sector scale up bundled solutions	Change in the capacity of key	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Stakeholder consultations	Annual	Not available	Not available	50	2025

	to decompose yield gaps.	organizations.									
Outcome	<b>IO 3.01</b> NARS staff, extension officers and researchers have knowledge and capacity to apply bundled solutions to bridge yield gaps.	Change in the capacity of key individuals	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Stakeholder consultations	Annual	Not available	Not available	150	2025
Output	<b>O 3.01</b> The state of the natural resource base and cause of yield gaps in CWANA's diverse farming systems analysed.	Number of other information products (reports, data and databases, web-based services)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			10	2023
Output	<b>O 3.02</b> Inventory of bundled solutions of evidence-based management practices and cropping systems to sustainably bridge yield gaps.	Number of other information products (reports, training content, data and databases, web-based services)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			25	2023
Output	<b>O 3.03</b> Socially inclusive management practices for growing more crops with less water and more	Number of peer reviewed journal papers	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			5	2024



	efficient use of fertilizers.										
Output	<b>O 3.04</b> Framework for soil health assessment in crop-livestock integrated farming systems.	Number of peer reviewed journal papers	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 3.05</b> Gender and youth sensitive value chain mechanization solutions for sustainable production.	Number of other information product (report, training content)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 3.06</b> Capacity of farmers, civil society organisations, NARS, private sector and Government built through stakeholder workshops, farmer field days, and training of trainers' events.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, LB, MA, SD, UZ	Primary	Training event report	Annual			400	2024
Output	<b>O 3.07</b> Agronomic management suited genotypes identified.	Number of other information products (report)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			10	2024
Output	<b>O 3.08</b> Recommendations of which	Number of other information	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			5	2024

	combinations of varieties/genotypes /crops and management practices are suitable for which farming systems.	n products (report)									
Outcome	<b>IO 3.02</b> Government, civil society including women- and youth-led organisations, and private sector scale up bundled solutions to bridge yield gaps.	Change in the capacity of key organizations	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Focus group discussions; Stakeholder consultations	Annual	Not available	Not available	25	2025
Output	<b>O 3.09</b> Investment strategy for scaling up bundled solutions to bridge yield gaps produced.	Number of other information products (briefs)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			5	2024
Output	<b>O 3.10</b> Gender- and youth-sensitive business models for scaling the bundled solutions.	Number of other information products (reports)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			5	2024
Output	<b>O 3.11</b> Youth and women-led organisations trained in business models.	Number of people trained, long-term and short-term, disaggregated	Number	EG, LB, MA, SD, UZ	Primary	Training event report	Annual			200	2024

		ted by gender									
Outcome	<b>EoIO 5</b> Government, private sector and civil society put into practice the integrated management of food, land, water and energy systems.	Number of policies, strategies, budgets, investments modified in design or implementation, informed by CGIAR research	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Focus group discussions; Stakeholder consultations	Annual	Not available	Not available	15	2025
Outcome	<b>IO 4.01</b> Public sector develops policy for the integrated management of food, land, water, and energy systems.	Number of policies, strategies, budgets, investments modified in design or implementation, informed by CGIAR research	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews; Focus group discussions; Stakeholder consultations	Annual	Not available	Not available	15	2025
Output	<b>O 4.01</b> The state of water and landscapes analysed.	Number of other information products (report, datasets)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			10	2023

		and database)									
Output	<b>O 4.02</b> Web-based dashboard of national and key basin water accounts developed.	Number of other information products (web-based services)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			1	2023
Output	<b>O 4.03</b> Capacity of intended users of web-based dashboard (policy makers) built.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, LB, MA, SD, UZ	Primary	Training event report	Annual			100	2023
Output	<b>O 4.04</b> Gender responsive community management plan for the sustainable use of natural resources in fragile and conflict-affected situations.	Number of other information products (report, training materials)	Number	EG, LB, MA	Primary	CGIAR and other data repositories	Semi-annual			3	2023
Output	<b>O 4.05</b> Application of Nexus Gains Initiative governance guidelines to additional CWANA countries.	Number of other information products (report)	Number	EG, LB, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2025

Output	<b>O 4.06</b> Investment strategies to strengthen the resilience of food, land, water and energy systems.	Number of other information products (report)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 4.07</b> Evidence-based policy advice for Nexus-reuse and shared resources between competing sectors.	Number of other information products (report)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 4.08</b> Guidelines for co-designing Nexus decision-support tools.	Number of other information products (report, training materials)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 4.09</b> Management factsheets about the Nexus inputs and outputs process and benefits.	Number of other information products (report, training materials)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2025
Output	<b>O 4.10</b> Multi-actor and sector partnerships and services for Nexus-WEF in stable and fragile contexts.	Change in the capacity of key networks	Number	EG, UZ	Primary	Initiative Annual Report	Annual			2	2023
Outcome	<b>IO 4.02</b> Government and private sector capacity built to	Change in the capacity of key	Number	EG, LB, MA	Primary	Key informant interviews;	Annual	Not available	Not available	3	2025

	manage water scarcity and variability.	organizations				Stakeholder consultations					
Output	<b>O 4.11</b> Cost-benefit of treated wastewater (TWW) reuse in marginal communities.	Number of other information products (report, briefs)	Number	EG, LB, MA	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 4.12</b> TWW reuse and substitution materials.	Number of other information products (report, training materials)	Number	EG, LB, MA	Primary	CGIAR and other data repositories	Semi-annual			6	2024
Output	<b>O 4.13</b> Water storage diagnostics based on NEXUS Gains methodology.	Number of other information products (report)	Number	EG, LB, MA	Primary	CGIAR and other data repositories	Semi-annual			3	2025
Output	<b>O 4.14</b> Capacity of Government and private sector built through multi-stakeholder dialogue events.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, LB, MA,	Primary	Training event report	Annual			125	2024
Outcome	<b>IO 4.03</b> Government and private sector capacity built to maintain and improve the	Change in the capacity of key	Number	EG, LB, MA, UZ	Primary	Key informant interviews; Stakeholder consultation	Annual	Not available	Not available	3	2025

	productivity of marginal and saline landscapes.	organizations									
Output	<b>O 4.15</b> Marginal and saline landscapes management demonstrated and roadmap for countries developed.	Number of other information products (report)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2023
Output	<b>O 4.16</b> Guidelines on the integration and scaling up of aquaculture (fish farming) and agriculture.	Number of other information products (report, training materials)	Number	EG, MA	Primary	CGIAR and other data repositories	Semi-annual			2	2024
Output	<b>O 4.17</b> Investment strategy for gender sensitive scaling up of integrated Nexus farming systems.	Number of other information products (report)	Number	EG, UZ	Primary	CGIAR and other data repositories	Semi-annual			2	2024
Output	<b>O 4.18</b> Capacity of Government, private sector and civil society built through multi-stakeholder dialogue events.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, UZ	Primary	Training event report	Annual			60	2024
Outcome	<b>EOIO 6</b> Government, civil society and private	Change in the capacity of	Number	EG, LB, MA, SD, UZ	Primary	Key informant interviews;	Annual	Not available	Not available	25	2025

	sector scale up innovations and digital tools for food value chain (FVC) climate risk management.	key organizations				Stakeholder consultations					
Outcome	<b>IO 5.01</b> Government, civil society and private sector use climate information services to understand climate risk.	Number of beneficiaries using the innovation, disaggregated by gender	Number	EG, MA, UZ	Primary	Initiative Annual Report	Annual	Not available	Not available	3	2025
Output	<b>O 5.01</b> Climate information service needs, provision of key actors and new data generation tools.	Number of other information products (report, data and databases)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2023
Output	<b>O 5.02</b> Web-based platform for climate analysis and early warning system.	Number of other information products (web-based services)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			1	2023
Output	<b>O 5.03</b> Climate of National Innovation Platforms (NIPs) characterised using web-based platform.	Number of other information products (report)	Number	EG, LB, MA, SD, UZ	Primary	CGIAR and other data repositories	Semi-annual			5	2024



Outcome	<b>IO 5.02</b> Civil society including youth and private sector develop digital tools for FVC climate risk management.	Change in the capacity of key organisations	Number	EG, MA, UZ	Primary	Knowledge, attitudes, and practices survey	Annual	Not available	Not available	300	2025
Output	<b>O 5.04</b> Assessment of existing agri- and market-advisory digital tools.	Number of other information products (report)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2023
Output	<b>O 5.05</b> Impact evaluation of existing digital tools for climate-resilient FVCs.	Number of other information products (report)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 5.06</b> Best practices for scaling up innovations and digital tools.	Number of other information products (report)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 5.07</b> Partnerships with incubators/accelerators set up.	Number of partnerships set up	Number	EG, MA, UZ	Primary	Initiative Annual Report	Annual			3	2023
Output	<b>O 5.08</b> Capacity of youth/women to develop digital innovations built through challenge calls and hack-a-thons.	Number of people trained, long-term and short-term, disaggrega	Number	EG, MA, UZ	Primary	Training event report	Annual			60	2023

		ted by gender									
Output	<b>O 5.09</b> Proto-type digital tools for climate-resilient FVCs brought to scaling readiness.	Number of innovations	Number	EG, MA, UZ	Primary	Initiative Annual Report	Annual			6	2025
Output	<b>O 5.10</b> Guidelines for accelerating the use of digital innovations and tools, securing financial support for SMEs and start-ups, and encouraging youth inclusive entrepreneurship.	Number of other information products (report, training materials)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 5.11</b> Match-making event between investors and digital innovators.	Number of partnerships set up.	Number	EG, MA, UZ	Primary	Matchmaking event report	Annual			24	2024
Outcome	<b>IO 5.03</b> SMEs, extension services, start-up and accelerator programs scale up digital tools for FVC climate risk management.	Change in the capacity of key organizations	Number	EG, MA, UZ	Primary	Key informant interviews; Focus group discussions; Stakeholder consultations	Annual	Not available	Not available	12	2025

Output	<b>O 5.12</b> Scaling digital investment roadmap with policies and business models for youth-inclusive entrepreneurship.	Number of other information products (report)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2025
Output	<b>O 5.13</b> Policy brief on how to support digitalization assisted climate risk management.	Number of other information products (briefs)	Number	EG, MA, UZ	Primary	CGIAR and other data repositories	Semi-annual			3	2024
Output	<b>O 5.14</b> Capacity of stakeholders to use the web-based platform, digital innovations and tools built.	Number of people trained, long-term and short-term, disaggregated by gender	Number	EG, MA, UZ	Primary	Training event report, Policy dialogue event reports	Annual			195	2024

## 6.2 MELIA plan

**MEL Plans** – The F2R-CWANA Initiative has developed performance indicators to measure its progress towards achieving the stated Outputs, Intermediate Outcomes, and the End of Initiative Outcomes; as well as its contributions to the Action Area Outcomes, and Collective Global Targets under the five CGIAR Action Areas. The Management Team (MT) will ensure annual and quarterly work plans are developed and monitor whether those activities are on schedule. Data needed for MEL purposes will be periodically collected and reported through CGIAR's management information system (MIS). The Initiative's MELIA focal point will regularly update the MEL database and inform the MT whether progress towards achieving the Outputs and Outcomes is on track. MT will course correct as necessary. Annual meetings, including stakeholders, will assess progress towards both output goals and outcomes. It will also evaluate whether the Initiative and WP level ToCs must be adapted.

Key learning questions for the evaluation process in the Initiative and work package ToCs, include:

- Is the Initiative engaging and bringing together key stakeholders and designing the innovation and technology packages to ensure uptake and underpin scaling readiness for efficient, inclusive and sustainable agrifood systems transformation in CWANA?
- Has the Initiative created credibility and trust concerning the effectiveness and scaling readiness of innovations and technologies promoted, and did it manage to engage policymakers to create enabling environment for fast-tracking technology adoption?
- Do outputs and outcomes of WPs align with their respective ToCs, or is course correction needed, and do the Initiative researchers effectively work as a team and exploit synergies across five WPs and relevant CGIAR initiatives?

The Initiative will facilitate an independent external review to assess its progress, credibility, relevance, and the scaling readiness of promoted policy, institutional, and technological innovations.

**Impact Assessment (IA) research plans** – Impact assessment research is embedded in five work packages of the Initiative. Relevant innovations and technologies are identified in each work package. Researchers with expertise in quantitative IA will design causal impact assessments to measure impacts attributable to the promoted innovations and technologies and determine their scaling readiness. These studies will provide evidence on the validity of the Initiative and WP ToC and contribute to their improvement by examining both the adoption of institutional and technological innovations and their impacts across the relevant impact areas. The evidence produced by these assessments will inform the direction of the Initiative's future phases, including what sections need to be corrected and which innovations and technologies are ready for scaling.

To assess outcomes and impacts of an innovation platform and CGIAR innovation accelerator, we will conduct a Qualitative Outcome Study to substantiate their contribution to fast-tracking technology adoption. The stakeholder dialogues and follow-up to those dialogues will document feedback on policy advising activities and the influence of policy and investment options analyses on policy decisions in the

selected countries. In collaboration with scaling partners, the Initiative will develop a plan for monitoring activities and data collection to document where and how the promoted innovations and technologies are used. The Initiative will use CGIAR's MIS to trace scaling activities. The Initiative will also compile and update baselines for the Outcome indicators and the Common Impact indicators in focus countries in CWANA.

### 6.3 Planned Monitoring, Evaluation, Learning and Impact Assessment (MELIA) studies and activities

Type of MELIA study or activity	Result or indicator title that the MELIA study or activity will contribute to.	Anticipated year of completion (based on 2022-24 Initiative timeline)	Co-delivery of planned MELIA study with other Initiatives	How the MELIA study or activity will inform management decisions and contribute to internal learning	Geographic scope
6. Ex-ante, baseline study (Gender disaggregated baseline study of beneficiaries' needs for innovations and new technologies in selected countries-WP1)	O 1.11, O 1.12, O 1.13	2022	Potentially with the following thematic initiatives: Rethinking Food Markets and VCs, NEXUS Gains, SeEdQUAL	Will inform Initiative and individual WPs research plans by identifying the main bottlenecks and risks faced by farmers relevant to innovation and technology adoption.	Global scope: no  Regions: Central and West Asia and North Africa
4. Qualitative Outcome Study (WP1)	O 1.01, O 1.02, O 1.03  IO 1.01	2023	No	Will substantiate contributions of CGIAR Innovation Accelerator and Innovation Platforms to policies and technology adoption by farmers; can help adjust the setup of the innovation accelerator and support the Initiative innovation portfolio management system.	Global scope: no  Regions: Central and West Asia and North Africa
1. Causal Impact Assessment learning study (Assessment of the impact of innovations aiming to build inclusive seed systems-WP2)	O 2.01, O 2.02, O 2.03, O 2.04  IO 2.01	2025	Potentially with SeEdQUAL	Will help to identify key bottlenecks in the landscape seed systems and ascertain priorities and opportunities for building robust and inclusive seed systems in the region; may help make corrections in the WP TOC.	Global scope: no  Regions: Central and West Asia and North Africa

3. Tracing of scaling activities & policy advice (Compilation of genetic innovations tested, and product profiles validated for CWANA-WP2)	O 2.06, O 2.07, O 2.08, O 2.09  IO 2.02	2024	SeEdQUAL	Will contribute to monitoring and assess progress towards outputs and outcome indicators; create a base for long-term, large scale impact assessment study.	Global scope: no  Regions: Central and West Asia and North Africa
2. Adoption or diffusion study  (Bundled solutions of evidence-based management practices to sustainably bridge yield gaps-WP3)	O 3.01, O 3.02, O 3.03  IO 3.01, IO 3.02	2023	TBD	Will contribute to better understanding policy and investment decisions concerning adoption of bundled management practices that make farming systems sustainable and boost productivity, employment, and income generation; can help adjust interventions if needed.	Global scope: no  Regions: Central and West Asia and North Africa
1. Causal Impact Assessment learning study  (Assessment of the impact of gender- and youth-sensitive business models for scaling the bundled management practices - WP3)	O 3.09, O 3.10, O 3.11  IO 3.02	2024	None	Will assess the impact of the gender- and youth-sensitive business models on technology adoption and productivity; may adjust if adoption is not sufficient and impact is not significant.	Global scope: no  Regions: Central and West Asia and North Africa
4. Qualitative Outcome Study  ("Toolbox of Nature-based Solutions"-WP4)	O 4.15, O 4.16, O 4.17, O 4.18  IO 4.03	2023	Potentially with NEXUS Gains	Will demonstrate contributions of the "Toolbox of Nature-based solutions" on the capacity to maintain and improve the productivity of marginal and saline landscapes, through using	Global scope: no  Regions: Central and West Asia and North Africa

				management roadmaps, guidelines, investment strategies for gender-sensitive scaling, and capacity building.	
1. Causal Impact Assessment learning study (Assessment of the impact of “Farm to Basin Smart Tools for Water Efficiency and Management” -WP4)	O 4.01, O 4.02, O.4.03, O 4.07, O 4.08  IO 4.01, IO 4.02	2025	Potentially with NEXUS Gains and Harnessing Digital Technologies	Expecting the implementation of Farm to Basin Smart Tools for Water Efficiency and Management improves the capacity to manage water scarcity and variability and thus benefit farmers’ efficiency; will inform scaling up strategy and help adjust interventions if necessary.	Global scope: no  Regions: Central and West Asia and North Africa
1. Causal Impact Assessment learning study (Experimental assessment of the impact of Weather-based irrigation advisory systems-WP5)	O 5.12, O 5.13, O 5.14  IO 5.04	2025	Harnessing Digital Technologies and NEXUS Gains	Expecting the implementation of Weather-based irrigation advisory systems will boost farmers’ productivity and resiliency; will inform scaling up strategy and help adjust interventions if necessary.	Global scope: no  Regions: Central and West Asia and North Africa
8. Other MELIA activity (Routine tracking of outputs)	All Outputs	Quarterly	No	Will monitor whether outputs are on track to be delivered and allow the IMT to consider course correction as necessary.	Global scope: no  Regions: Central and West Asia and North Africa  Countries: EG, LB, MA, SD, UZ



8. Other MELIA activity Annual review and evidencing of the TOC	All Outputs, Outcomes, and Targets	Annually	No	Will assess progress towards output goals and action area targets, and support decisions on whether the Initiative and WP level TOCs must be adapted.	Global scope: no  Regions: Central and West Asia and North Africa  Countries: EG, LB, MA, SD, UZ:
8. Other MELIA activity Annual review and evidencing of the Projection of Benefits	All Outputs, Outcomes, and Targets	Annually	No	Will assess if and how to Initiative is likely to achieve impact at scale across the five Impact Areas.	Global scope: no  Regions: Central and West Asia and North Africa  Countries: EG, LB, MA, SD, UZ:
8. Other MELIA activity Compile baselines for the IOs, EoIOs, Action Area Outcomes, and the Collective global 2030 target indicators.	All Outcomes and Targets	Annually	Coordination across Initiatives in the region is possible	Will provide the baseline values against which the impact of the Initiative will be measured.	Global scope: no  Regions: Central and West Asia and North Africa  Countries: EG, LB, MA, SD, UZ:

## 7. Management plan and Risk assessment

### 7.1 Management plan

F2R-CWANA's management plan is guided by a management structure for partnerships for inclusiveness, feedback and learning, and future planning.

1. The **management structure** of the Initiative will be a) Initiative, Work Package, and thematic leads, b) an Initiative Management Team (IMT), and c) a Steering Committee (SC).
  - a. Leads will be appointed for the Initiative as a whole (lead and co-lead), for each Work Package, and for the thematic areas of Gender, Capacity Development, and Fragility. Leads are responsible for ensuring the successful delivery of the area they lead, and it is expected that they will set up a system to ensure regular communication, monitoring, troubleshooting, and guidance with the scientists, country managers, professional staff, partners, stakeholders, and beneficiaries within the scope of their area of leadership.
  - b. The IMT will be comprised of the Initiative lead and co-lead and the WP leads. The IMT will meet on a bi-annual basis and more regularly as and when required, to monitor the progress of activities and outputs against the Annual Plan of Results, the budget, perform risk assessment and management, review and update the Theories of Change, review and update the Projection of Benefits, and ensure that stakeholder engagement, the gender and inclusion and capacity development activities are progressing. The IMT is responsible for ensuring the successful delivery of the Initiative as a whole.
  - c. The SC will be comprised of the Initiative lead and co-lead, the Global Director Resilient Agri-Food Systems, the Regional Director of CWANA, relevant Country Managers, CGIAR Impact Area leaders, and selected NARES, donor, stakeholder, and beneficiary representatives. The SC will meet once a year and provide feedback and guidance on the progress, implementation, and future direction of the Initiative.
2. A nimble approach to delivery and right-sizing innovations through a constant flow of **feedback and learning**. Active and regular engagement from members of the IMT with Country Managers, and partners will be key. Regular interactions both in-person and online will ensure a two-way flow to gather and utilize information and data to strengthen outputs and ensure timely delivery of outcomes.
3. Stakeholder engagement from across the spectra of demand, innovation and scaling will inform **future planning** for growth, resilience and adaptability for F2R-CWANA. This will be supported by implementing actors at CGIAR level, a detailed Results Framework, scaling and readiness, and MELIA plans, so course correction can be made to identify emerging priorities.

### 7.2 Summary management plan Gantt table

Initiative Start Date	Timelines	Description of key deliverables
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	2022			2023				2024				2025	
Work Packages	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	
Work package 1:			1	2					3				1. Policy, regulatory, and institutional constraints and opportunities for agrifood systems transformation analysed. 2. Strategy to scale up innovations in technology and service provisions, with a focus on gender and youth differentiated impact. 3. Overcome intersectional marginalisation (gender intersecting with refugee status, age, class, and other social identities).
Work package 2:		1							2			3	1. Agrobiodiversity hotspots in CWANA identified and characterized. 2. Policy reviews and recommendations for the release of Genetic Innovations, seed system diversification, and conservation of agrobiodiversity. 3. Germplasm of the selected advanced lines available for NARS release/registration process.
Work package 3:			1				2				3		1. The state of the natural resource base and cause of yield gaps in CWANA's diverse farming systems analysed. 2. Bundled solutions of evidence-based management practices to sustainably bridge yield gaps. 3. Youth and women-led organisations trained in business models.
Work package 4:			1			2					3		1. Web-based dashboard of national and key basin water accounts. 2. Cost-benefit of treated wastewater (TWW) reuse in marginal communities. 3. Investment strategies to strengthen the resilience of food, land, water and energy systems.
Work package 5:			1							2		3	1. Climate risk profiles of FVC components and actors. 2. Capacity of youth/women to develop digital innovations built through challenge calls and hack-a-thons. 3. Scaling digital investment roadmap with policies and business models for youth-inclusive entrepreneurship.
Innovation Packages & Scaling Readiness							1			2		3	1. Five documented scaling ambition, vision of success and roadmap for use of Scaling Readiness for selected priority Core Innovations (Light Track). 2. Four documented scaling ambition, vision of success and roadmap for use of Scaling Readiness for selected priority Core Innovations (Light

													Track). <b>3.</b> Five evidence-based Scaling Readiness assessment reports and related scaling strategies for Innovation Package (Standard Track).
<b>MELIA</b>			1	2	1		1,3	2	1		1	2	<b>1.</b> Routine tracking of Outputs. <b>2.</b> Annual review and evidencing of the TOC. <b>3.</b> Two qualitative outcome studies to substantiate contributions of innovation accelerator and learning by reflection framework to policy and fast-tracking technology adoption.
<b>Project Management</b>	1		1,2		1		1,2		1		1,2	3	<b>1.</b> Initiative Management Team meetings. <b>2.</b> Planning and reporting (including Annual Plan of Results and Budget, Technical and Financial reporting). <b>3.</b> Finalising Initiative period 2022-2024 and preparing for next Initiative period 2025-2027.

### 7.3 Risk assessment

The Initiative design team undertook a risk assessment exercise to identify and evaluate the main risks and mitigating actions for the Initiative. Risks considered included around science, cohesion (including intended and unintended consequences of technologies/innovations for natural resources, GHG emissions, and social and economic aspects), legacy work, partnerships, talent, operational, ethical and legal and other. At this phase the risk assessment is used to highlight areas of concern and improvement recommendations for the Initiative. It also provides visibility to different bodies that is needed from a good governance perspective in line with the Risk Management Framework of the CGIAR System. Following the Initiative's approval, the risk assessment will be integrated into the Initiatives work plan for continuous monitoring and management.

Main risks identified are set out as follows:

Top 5 risks to achieving impact (note relevant Work Package numbers in brackets)	Description of risk (50 words max each)	Likelihood	Impact	Risk score Likelihood x Impact	Mitigation
		Rate from 1-5	Rate from 1-5		
Business interruption or delays due to pandemic, war, natural disaster or other incident affecting the Initiative or key dependencies. <b>[all WPs]</b>	Fragility and instability are key features of CWANA, due to conflict and social unrest, social and economic inequalities, and high vulnerability to climate change, water scarcity and other environmental challenges. These issues have previously caused	5	4	20	A risk register will be developed for each country and, in conjunction with security updates from official channels and from colleagues with local knowledge, the situation will be reviewed on a high-frequency monthly

	interruptions of CGIAR activities in Syria, Libya, Iran, Iraq, Sudan, Lebanon, and Afghanistan.				basis. In the event of the deterioration of a local/national/regional situation, contingency plans will be made to ensure the safety and security of people, assets, contracts with partners and suppliers, and ongoing research activities. Systems are already in place to ensure effective remote working and stable methods of communication.
Influencing and advancing policy and regulatory environment implications not adequately understood or accounted for by the Initiative, hindering the uptake of innovations. <b>[all WPs]</b>	The policy and regulatory environments of CWANA are well understood but can be difficult to influence because of highly centralized government decision-making, frequent Government reshuffles, a lack of process for coherent and long-term policy planning and implementation, strong competition among various sectors for scarce resources, and issues not prioritized despite their critical importance.	4	4	16	Each WP has defined outputs that aim to evaluate the policy and regulatory environment for the given topic, make recommendations to create a more enabling environment, and facilitate dialogue with policymakers. The F2R-CWANA Initiative plans to proactively create a space for ongoing policy engagement and appreciation of the value of the evidence-based policy support the CGIAR can provide through the WP1 NAS and Innovation Platforms. The dependence on the policy and regulatory environment will be different for each innovation and this will be assessed during the scaling readiness exercise.
Funding uncertainty, budget insecurity or delay due to geopolitical events /disasters shifting funders' priorities. <b>[all WPs]</b>	Donors have not traditionally focused on the CWANA region for on-going long-term investments in food, water, land, and energy systems' transformation. Much of the aid coming to the region is targeted at short-term humanitarian objectives in fragile countries	4	4	16	The initiative is organized to reflect a humanitarian-development-peace nexus approach, which donors now understand as necessary to address the root causes of instability, rather than focusing on short-term crisis responses only. We intend to broaden the

	and is highly sensitive to political considerations.				funding base by engaging regional donors into the CGIAR portfolio.
Failure to attract, engage, develop and retain talent. <b>[all WPs]</b>	It is difficult to develop and retain talent in CWANA due to chronic underfunding of research in the public sector, lack of engagement with the private sector, and the high frequency of youth and professional migration to richer countries in the region, and beyond. This challenge is faced by our partners and potentially within the CGIAR itself.	4	4	16	The FR2-CWANA Initiative mitigates this risk within our partner organizations by focusing on capacity building and partnering with the private sector. Within CGIAR, the key will be providing challenging, rewarding, and equitable professional opportunities. A comprehensive capacity development programme for both CGIAR staff and partner organisation staff will be developed to mitigate this risk.
Inappropriate balance between private and public goods generated by the portfolio may affect Initiative objectives. <b>[all WPs]</b>	Goods in the CWANA region are predominantly generated by the public sector as the enabling environment for public-private partnerships is not well developed and it is difficult for the private sector to attract investment and thrive while having to bear the financial risks of operating in this fragile region on their own.	4	3	12	The inclusion of a strong focus on the private sector is envisioned as a corrective to the current reliance on the public sector. The FR2-CWANA Initiative will identify relevant private sector partners in order to establish long-term, sustainable, beneficial partnerships.

## 8. Policy compliance, and oversight

### 8.1 Research governance

Researchers involved in the implementation of this Initiative will comply with the procedures and policies determined by the System Board to be applicable to the delivery of research undertaken in furtherance of CGIAR's 2030 Research and Innovation Strategy, thereby ensuring that all research meets applicable legal, regulatory and institutional requirements; appropriate ethical and scientific standards; and standards of quality, safety, privacy, risk management and financial management. This includes CGIAR's Research Ethics

Code<sup>xlviii</sup> and to the values, norms and behaviors in CGIAR's Ethics Framework<sup>xlix</sup> and in the Framework for Gender, Diversity and Inclusion in CGIAR's workplaces<sup>i</sup>.

## 8.2 Open and FAIR data assets

Researchers involved in the implementation of this Initiative shall adhere to the terms of the Open and FAIR Data Assets Policy<sup>ii</sup>.

The F2R-CWANA Initiative will align with the OFDA Policy's Open and FAIR requirements, ensuring:

- Rich metadata conforming to the CGIAR Core Schema<sup>iii</sup> to maximize findability, including geolocation information where relevant.
- Accessibility by utilizing unrestrictive, standard licenses (e.g. Creative Commons<sup>liii</sup> for non-software assets; General Public License (GPL<sup>liv</sup>)/Massachusetts Institute of Technology (MIT<sup>lv</sup>) for software), and depositing assets in open repositories.
- Wider access through deposition in open repositories of translations and requiring minimal data download to assist with limited internet connectivity.
- Interoperability by annotating dataset variables with ontologies where possible (controlled vocabularies where not possible).
- Adherence to Research Ethics Code<sup>xlviii</sup> (Section 4) relating to responsible data (through human subject consent, avoiding personally identifiable information in data assets and other data-related risks to communities).

## 9. Human Resources

### 9.1 Initiative team

	Area of Expertise	Short description of key accountabilities
Management	Strategic management	Initiative Leadership, lead Annual Workplan Budget (AWBP), delivery, monitoring and reporting, links across other Initiatives and CGIAR, external Initiative representation.
	WP strategic management	Lead WP AWPB and implementation within and across WPs; manage research and research support staff.
	MELIA	Support Initiative Leadership to coordinate Results Framework and manage delivery of Outputs and contributions to Outcomes.
	Gender / social inclusion	Coordination and leadership of Reach-Benefit-Empower-Transform (RBET) strategy for F2R-CWANA.
	Fragility	Lead on impact of conflict exposure/fragility; lead/monitor situation in-country and advise adjustments responsive to new sources of risk.

<sup>xlviii</sup> [CGIAR Research Ethics Code](#)

<sup>xlix</sup> [CGIAR's Ethics Framework](#)

<sup>i</sup> [Framework for Gender, Diversity and Inclusion in CGIAR's workplaces](#)

<sup>ii</sup> [CGIAR Open and FAIR Data Assets Policy](#)

<sup>iii</sup> [CGIAR Core Schema](#)

<sup>liii</sup> <https://creativecommons.org/licenses/>

<sup>liv</sup> <http://www.gnu.org/licenses/gpl-3.0.en.html>

<sup>lv</sup> <https://spdx.org/licenses/MIT.html>

	Communications / outreach	Lead transformation from research to information, communications tools and policy practice and outreach under guidance of Initiative leadership (Research support).
	Administrative	Administrative, financial and HR leadership under the guidance of Initiative Management (Research Support).
WP1	Socio-economics	Lead development of tools for adoption and impact assessments of innovations and monitor socio-economic surveys.
	Policy	Lead on partner cooperation and strengthening institutional capacity, support and engagement with policies and instruments.
	Agricultural innovation and technology	Lead and coordinate technical assistance for innovations and impact and develop sustainable road maps for wide scale adoption in-field; assess capacity building opportunities; and development of joint knowledge sharing activities.
	Data management and analysis specialist	Support survey design, sampling, collection, analysis and visualization; Support development of data collection instruments, recoding, reporting and disseminating findings and recommendations and lessons learned.
WP2	Agrobiodiversity	Lead on status/threats assessment; development and demonstration of management plan, training; technical backstopping and training.
	Plant breeders	Design experiments to support release/registration of adapted and farmer/industry/consumer preferred varieties for crops and facilitate dissemination/adoption.
	Seed systems and product management	Lead seed system research; studies on early generation seed production models; provide data to support updated policies and regulatory frameworks for functioning of seed systems at national and regional levels; and strengthen the capacity of seed value chain actors.
	Socio-economics and policy	Lead research and analysis of seed production / marketing models; adoption/impact of genetic innovations; and policy for biodiversity and seed systems.
	Data management	Ensure data collected in various research activities are collected, managed and analysed.
WP3	Systems agronomy / Cropping systems	Cropping systems optimization, conservation agriculture (CA) based sustainable intensification, G x E x M x S interaction and recommendation domains of agronomic management targeted crop varieties, business models and science evidence-based policies, capacity development on CA.
	Water management / hydrology	On-farm water management - designing/targeting precision water management tools/techniques; improving crop water productivity; state of the natural resource base.
	Soil scientist	Develop soil health frameworks for crop-livestock systems across participatory research and innovation platforms.
	Cropping system simulation	Coordinate scenario analysis for designing cropping systems, management practices for diverse biophysical and socio-economic environment.
	Mechanization specialist	Designing/ scaling appropriate mechanization solutions appropriate for dryland systems and innovation platforms.
	Geospatial and data	Geospatial analysis and mapping state of natural resources, yield gap analysis.
	Farming systems modelling	Farming systems analysis, designing climate-resilient farming systems and landscapes options with synergies and trade-offs, and targeting.
	Socio-economics and policy	Lead management practices to solutions; recommendation for management practices and varieties/genotypes suitable to specific farming systems.
WP4	IWRM	Plan, design, and manage the coordinated development and management of water, land and related resources.
	Hydrology and agricultural water management	Integrated assessments; quantitative and qualitative field experiments (incl. design, data collection, analysis).
	Water governance	Co-Design the water governance guidelines including tailoring to local conditions and conduct water governance analysis to support scaling.



	TWW	Lead the TWW socio-economic feasibility study and facilitate the group discussion and inform policy development.
	Water accounting	Support integrated assessments and policy activities including policy development/coherence; design / conduct water accounting.
	Policy analysts	Support scaling; knowledge synthesis; cooperation to support policy / decision-making process; outreach / science-policy activities' development, and assessments.
	Remote sensing data / GIS	Support the data acquisition and lead the co-design the dashboard's development.
	DSS and model integration	Lead the integrated assessment including coding and integrated modelling analysis and assessment.
WP5	Climate science, crop and climate hazard modelling	Lead climate risk analyses of selected value chains in CWANA; climate analytics and early warning systems to characterize innovation platforms.
	Economics	Identify, evaluate, prioritize digital solutions for climate risks management in value chains; assess business case; lead financial/impact evaluation of digital solutions.
	Data science/augmentation	Support development and integration of digital solutions for climate risk management. Facilitates digitalization of agriculture, tools and data management.
	Incubation/acceleration	Lead incubator/accelerator programs on digital solutions; develop pipelines of bankable digital solutions to be brought to market and scaled (Research support).
	Sustainable finance	Lead strategy and digital investment roadmaps with public/private investors to connect with national/regional/global public and private investors (Research support).

## 9.2 Gender, diversity and inclusion in the workplace

The Initiative team is unlikely to meet CGIAR's gender target of a minimum of 40% women in professional roles and/or will not be comprised of individuals from diverse backgrounds. To address this, we will consciously consider diversity when we recruit/ follow the guidance outlined in CGIAR's GDI Inclusive Recruitment Toolkit<sup>lvi</sup> and mindfully include diverse voices in all our project activities.

Women, minorities, and other under-represented groups will hold leadership roles in the Initiative team. This will be seen in the composition of our senior team and will extend to the fair allocation of leadership activities and accountabilities.

## 9.3 Capacity development

The F2R-CWANA Initiative will develop an overarching capacity development programme to meet the capacity development needs of the following actors:

1. CGIAR staff involved in the implementation of the Initiative:
  - a. Initiative team leaders and managers will complete training on inclusive leadership within three months of the Initiative launch.
  - b. Initiative team members will complete training on gender, diversity, and inclusion (GDI), including on whistleblowing and how to report concerns.
  - c. Tailored training courses organized in partnership with advanced research institutions (ARIs) on, e.g. "How to run effective multi-stakeholder platforms".

<sup>lvi</sup> [Inclusive Recruitment: A Gender, Diversity and Inclusion Toolkit for People and Culture Practitioners - CGIAR](#)

2. National Agricultural Research and Innovation Systems (NARIS) staff involved in the implementation of the Initiative:
  - a. The Initiative kick-off will include an awareness session on CGIAR's values, code of conduct and range of learning opportunities available within CGIAR.
  - b. Tailored training courses on technical and managerial skills.
3. Selected individuals from the CWANA region, that are at the beginning of their professional working lives, will be given opportunities for education, training and professional development in the form of:
  - a. MSc and PhD degree scholarships and project placements, hosting, and supervision.
  - b. Mentorship, internship, secondment opportunities.
  - c. Conference attendance, study visits, field site visits.
4. Selected individuals that are active members of their community and beneficiary group (e.g. youth, women, migrants/IDP) will be offered training courses on, e.g. "Facilitating local stakeholder collaboration", "Methods and tools for delivering knowledge for impact".
5. The capacity development activities, outputs, outcomes, and impact pathways of the Initiative work packages will be supported by Capacity Development professionals.

## 10. Financial Resources

The total aspirational budget of USD 30,000,000 for F2R-CWANA Initiative from Q2 2022-Q1 2025 and covers work in the five countries of Egypt, Lebanon, Morocco, Sudan and Uzbekistan. The budget was calculated based on the identified funding needs of the five WPs, the Innovation Packages & Scaling Readiness plan, and MELIA which has been included in the Cross-cutting across Work Packages.

### 10.1 Budget

#### 10.1.1: Activity breakdown

USD	2022/2023	2023/2024	2024/2025	Total
<b>Crosscutting across Work Packages</b>	1,163,136	1,299,442	1,463,341	3,925,919
<b>Work Package 1</b>	1,400,596	1,572,738	1,746,883	4,720,217
<b>Work Package 2</b>	1,567,196	1,744,168	1,924,399	5,235,763
<b>Work Package 3</b>	1,487,477	1,775,215	2,005,457	5,268,149
<b>Work Package 4</b>	1,432,436	1,569,948	1,715,870	4,718,254
<b>Work Package 5</b>	1,445,348	1,593,385	1,742,965	4,781,698
<b>Innovation packages &amp; Scaling Readiness</b>	588,659	481,764	279,577	1,350,000
<b>Total</b>	<b>9,084,848</b>	<b>10,036,660</b>	<b>10,878,492</b>	<b>30,000,000</b>

#### 10.1.2: Geography breakdown

USD	2022/2023	2023/2024	2024/2025	Total
<b>Egypt</b>	2,544,779	2,815,976	3,058,032	8,418,788
<b>Lebanon</b>	1,262,802	1,392,586	1,504,767	4,160,155

<b>Morocco</b>	2,218,014	2,458,373	2,667,553	7,343,940
<b>Sudan</b>	1,205,408	1,334,610	1,454,601	3,994,619
<b>Uzbekistan</b>	1,853,845	2,035,115	2,193,538	6,082,499
<b>Total</b>	<b>9,084,848</b>	<b>10,036,660</b>	<b>10,878,492</b>	<b>30,000,000</b>

## References

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- <sup>1</sup> Waha, K., Krummenauer, L., Adams, S. Aich, V., Baarsch, F., Coumou, D., Fader, M., Hoff, H., Jobbins, G., Marcus, R., Mengel, M., Otto, I.M., Perrette, M., Rocha, M., Robinson, A. & Schleussner, C.-F. (2017) Climate change impacts in the Middle East and Northern Africa (MENA) region and their implications for vulnerable population groups. *Regional Environmental Change* **17**, 1623–1638. <https://doi.org/10.1007/s10113-017-1144-2>
- <sup>2</sup> Driouech, F., ElRhaz, K., Moufouma-Okia, W., Arjdal, K. & Balhane, S. (2020) Assessing Future Changes of Climate Extreme Events in the CORDEX-MENA Region Using Regional Climate Model ALADIN-Climate. *Earth Systems and Environment* **4**, 477–492 (2020). <https://doi.org/10.1007/s41748-020-00169-3>
- <sup>3</sup> IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press. Available at: [https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Full\\_Report.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf)
- <sup>4</sup> Zscheischler, J., Westra, S., van den Hurk, B.J.J.M., Seneviratne, S.I., Ward, P.J., Pitman, A., AghaKouchak, A., Bresch, D.N., Leonard, M., Wahl, T. & Zhang, X. (2018) Future climate risk from compound events. *Nature Climate Change* **8**, 469–477. <https://doi.org/10.1038/s41558-018-0156-3>
- <sup>5</sup> The World Bank Group (2022) Middle East and North Africa Climate Roadmap (2021-2025): Driving transformational climate action and green recovery in MENA. Available at: <https://thedocs.worldbank.org/en/doc/6f868d4a875db3ef23ef1dc747fcf2ca-0280012022/original/MENA-Roadmap-Final-01-20.pdf>
- <sup>6</sup> OECD/FAO (2018) OECD-FAO Agricultural Outlook 2018-2017. OECD Publishing, Paris/Food and Agriculture Organization of the United Nations, Rome. [https://doi.org/10.1787/agr\\_outlook-2018-en](https://doi.org/10.1787/agr_outlook-2018-en)
- <sup>7</sup> Abdelali-Martini, M., & Dey de Pryck, J. (2015). Does the feminisation of agricultural labour empower women? Insights from female labour contractors and workers in Northwest Syria. *Journal of International Development*, **27**(7), 898-916. <https://doi.org/10.1002/jid.3007>
- <sup>8</sup> Frija, A., Chebil, A., Mottaleb, K. A., Mason-D'Croz, D., & Dhehibi, B. (2020) Agricultural growth and sex-disaggregated employment in Africa: Future perspectives under different investment scenarios. *Global Food Security*, **24**. <https://doi.org/10.1016/j.gfs.2020.100353>
- <sup>9</sup> Najjar, D., Baruah, B., & Al Garhi, A. (2020). Gender and Asset Ownership in the Old and New Lands of Egypt. *Feminist Economics*, **26**(3), 119-143. <https://doi.org/10.1080/13545701.2020.1743877>
- <sup>10</sup> Najjar, D., Baruah, B., & Al Garhi, A. (2019). Women, Irrigation and Social Norms in Egypt: “The more things change, the more they stay the same?”. *Water Policy*, **21**(2), 291-309. <https://doi.org/10.2166/wp.2019.154>
- <sup>11</sup> Najjar, D., Baruah, B., Aw-Hassan, A., Bentaibi, & G., Kassie. (2018). Women, Work and Wage Equity in Agricultural Labour in Saiss, Morocco. *Development in Practice*, **28**(4), 1–16. <https://doi.org/10.1080/09614524.2018.1449813>

- 
- <sup>12</sup> McKee, M., Keulertz, M., Habibi, N., Mulligan, M., & Woertz, E. (2017) Demographic and Economic Material Factors in the MENA Region. Middle East and North Africa Regional Architecture: Working Papers No. 3, October 2017. Available at: [https://www.iai.it/sites/default/files/menara\\_wp\\_3.pdf](https://www.iai.it/sites/default/files/menara_wp_3.pdf)
- <sup>13</sup> Baada, J., & Najjar, D. (2020). A Review of The Effect of Migration on the Feminization of Agrarian Dryland Economies. *Journal of Gender, Agriculture and Food Security*, **5**(2), 1-12. <https://doi.org/10.19268/JGAFS.522020.1>
- <sup>14</sup> International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD). (2009). Agriculture at a Crossroads: Volume I Central & West Asia & North Africa (CWANA) Report. Eds McIntyre, B.D., Herren, H.R., Wakhungu, J. & Watson, R.T. Island Press, Washington DC. Available at: [downloadjsessionid=3EB1118B9B76A2E0DBE5E4286A7D634E \(psu.edu\)](https://www.psu.edu/downloadjsessionid=3EB1118B9B76A2E0DBE5E4286A7D634E)
- <sup>15</sup> Yigezu, Y.A., Bishaw, Z., Niane, A.A., Alwang, J., El-Shater, T., Boughlala, M., Aw-Hassan, A., Tadesse, W., Bassi, F.M., Amri, A., & Baum, M. (2021) Institutional and farm-level challenges limiting the diffusion of new varieties from public and CGIAR centers: The case of wheat in Morocco. *Food Security*. **13**, 1359–1377. <https://doi.org/10.1007/s12571-021-01191-7>
- <sup>16</sup> Dixon, J., Bhuiyan, S., & Ustuner, Y. (2018) Public Administration in the Middle East and North Africa. *International Journal of Public Administration*, **41**(10), 759-764. <https://doi.org/10.1080/01900692.2018.1433207>
- <sup>17</sup> Bhuiyan, S. & Farazmand, A. (2020) Society and Public Policy in the Middle East and North Africa, *International Journal of Public Administration*, **43**(5), 373-377. <https://doi.org/10.1080/01900692.2019.1707353>
- <sup>18</sup> Verner, D. & Breisinger, C. (2013) Economics of Climate Change in the Arab World: Case Studies from the Syrian Arab Republic, Tunisia, and the Republic of Yemen. Washington, DC: World Bank. <https://www.doi.org/10.1596/978-0-8213-9846-3>
- <sup>19</sup> Abay, K.A., Abdelaziz, F., Abdelfattah, L.A., Breisinger, C., Dorosh, P. A., Resnick, D., Siddig, K. & William, A. (2022) Wheat subsidies, wheat markets and food security in Sudan: Current state and options for the future. *SSSP Policy Note 1*. Washington, DC: International Food Policy Research Institute (IFPRI). <https://doi.org/10.2499/p15738coll2.134970>
- <sup>20</sup> Resnick, D. (2021) Political economy of wheat value chains in post-revolution Sudan. *SSSP Working Paper 1*. Washington, DC: International Food Policy Research Institute (IFPRI). <https://doi.org/10.2499/p15738coll2.134701>
- <sup>21</sup> Dorosh, P.A. (2021) Distributional consequences of wheat policy in Sudan: A simulation model analysis. *SSSP Working Paper 2*. Washington, DC: International Food Policy Research Institute (IFPRI). <https://doi.org/10.2499/p15738coll2.134867>
- <sup>22</sup> Sdravovich, C., Sab, R., Zouhar, Y. & Albertin, G. (2014) Subsidy Reform in the Middle East and North Africa: Recent Progress and Challenges Ahead. Washington, DC. IMF. Available at: <https://www.imf.org/external/pubs/ft/dp/2014/1403mcd.pdf>
- <sup>23</sup> Kelley, C., Mohtadi, S., Cane, M.A. & Kushnir, Y. (2015) Climate change in the Fertile Crescent and implications of the recent Syrian drought. *PNAS* **112**(11). <https://doi.org/10.1073/pnas.1421533112>
- <sup>24</sup> Fiertz, N., Haken, N., Taft, P., Sample, E., Wilson, W., Cockey, S., Woodburn, D., Deleersnyder, A.-E., Diop, A., Batterman, D., Reger, K., Smith, K., Hoduski, N. & Kramer, O. (2021) Fragile States Index Annual Report

---

2021. The Fund for Peace. <https://fragilestatesindex.org/2021/05/20/fragile-states-index-2021-annual-report/>

<sup>25</sup> Läderach, P., Schapendonk, F., Ruckstuhl, S., Dutta Gupta, T., Biradar, C., Nangia, V., Udalagama, U., Hugh, B., Yigezu, Y.A., Najjar, D., Dessalegn, B., Dhehibi, B., Cosgrove, B., Grosjean, G., Fria, A., Govind, A., Kleinermaun, C., Rischkowsky, B.A., Mapedza, E., Lahham, N., Elmahdi, A., Joshi, D., Nicol, A., Giriraj, A., Madurga-Lopez, I. & Pacillo, G. (2022) Climate Security in the MENA Region. *CGAIR FOCUS Climate Security*. <https://hdl.handle.net/10568/117616>

<sup>26</sup> Institute for Economics & Peace. (2021) Ecological Threat Report 2021: Understanding Ecological Threats, Resilience and Peace, Sydney. Available at: <http://visionofhumanity.org/resources>

<sup>27</sup> Sadoff, C.W., Borgomeo, E. & de Waal, D. (2017) Turbulent Waters: Pursuing Water Security in Fragile Contexts. World Bank, Washington, DC. World Bank. Available at: <https://openknowledge.worldbank.org/handle/10986/26207>

<sup>28</sup> Black, R., Bennett, S., Thomas, S. & Beddington, J. (2011) Migration as adaptation. *Nature* **478**, 477-449. <https://doi.org/10.1038/478477a>

<sup>29</sup> Cardoso, M.M.D. (2018) The Syrian refugee crisis and the humanitarian response in Lebanon: refugee protection and adoption of negative coping mechanisms. Master's thesis, Iscte - Instituto Universitário de Lisboa. <http://hdl.handle.net/10071/17603>

<sup>30</sup> Ruckstuhl, S. & Ward, C. (2017) Water Scarcity, Climate Change and Conflict in the Middle East: Securing Livelihoods, Building Peace. I.B. Tauris and Company, London.

<sup>31</sup> Nelson, V. and Morton, J. for CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2020) CGIAR Research Program 2020 Reviews: Climate Change, Agriculture and Food Security. Rome: CAS Secretariat Evaluation Function. Available at: <https://cas.cgiar.org/evaluation/publications/cgiar-research-program-crp-2020-review-climate-change-agriculture-and-food>

<sup>32</sup> Merrey, D., McLeod, R. & Szonyi, J. (2015) External Evaluation of the CGIAR Research Program on Dryland Systems Volume 1: Main Report. Amman, Jordan: ICARDA. Available at: <https://repo.mel.cgiar.org/handle/20.500.11766/3298>

<sup>33</sup> Jackson, M.T., Borja Tome, M.J., and Ford-Lloyd, B. for CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2017) Evaluation of CGIAR research support program for Managing and Sustaining Crop Collections: Genebanks CRP. Summary Report. Available at: <https://cas.cgiar.org/sites/default/files/pdf/Genebanks-CRP-evaluation-Summary-Report.pdf>

<sup>34</sup> Badstue, L., Petesch, P., Williams, G., & Umantseva, A., with Moctezuma, D. (2017) Gender and innovation processes in wheat-based systems. GENNOVATE Report to the CGIAR Research Program on Wheat. *GENNOVATE Research Paper*. Mexico, D. F.: CIMMYT. Available at: <https://gennovate.org/wp-content/uploads/2018/10/CRP-MAIZE-Gennovate-Report.pdf>

<sup>35</sup> Lenné, J. & Poulter, G. for CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2020) CGIAR Research Program 2020 Reviews: Grain Legumes and Dryland Cereals. Rome: CAS Secretariat Evaluation Function. Available at: <https://cas.cgiar.org/evaluation/publications/crp-2020-review-grain-legumes-and-dryland-cereals-gldc>

<sup>36</sup> Engel, P.G.H. & Laanouni, F. for CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2020) CGIAR Research Program 2020 Reviews: Policies, Institutions, and Markets. Rome: CAS Secretariat

---

Evaluation Function. Available at: <https://cas.cgiar.org/evaluation/publications/crp-2020-review-policies-institutions-and-markets-pim>

<sup>37</sup> Coombs, D. & Lenné, J. for CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2020) CGIAR Research Program 2020 Reviews: Roots, Tubers and Bananas (RTB). Rome: CAS Secretariat Evaluation Function. Available at: <https://cas.cgiar.org/evaluation/publications/crp-2020-review-roots-tubers-and-bananas-rtb>

<sup>38</sup> Sadras, V. & Podems, D. for . for CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2020) CGIAR Research Program 2020 Reviews: WHEAT. Rome: CAS Secretariat Evaluation Function. Available at: <https://cas.cgiar.org/evaluation/crp-2020-WHEAT>

<sup>39</sup> Humphrey, S. & Fabricius, C. for for CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2020) CGIAR Research Program 2020 Reviews: Water, Land and Ecosystems (WLE). Rome: CAS Secretariat Evaluation Function. Available at: <https://cas.cgiar.org/evaluation/publications/crp-2020-review-wle>

<sup>40</sup> Ragetlie, R., Najjar, D., & Baruah, B. (2021). Paying 'lip service' to gender equality: The hollow implementation of gender mainstreaming in Jordan. In special issue "Challenging Power and Inequality: Gender and Social Justice in the Middle East". *Civil Society Review*, November (5): 17-45. <https://dx.doi.org/10.28943/CSR.005>

<sup>41</sup> Najjar, D., Baruah, B., & Al Garhi, A. (2020). Gendered Patterns of Asset Ownership and Control in Egypt. *Feminist Economics*, **26**(3), 119-143. <https://doi.org/10.1080/13545701.2020.1743877>

<sup>42</sup> Galiè, A., Jiggins, J. & Struik, P.C. (2013). Women's identity as farmers: A case study from ten households in Syria. *NJAS-Wageningen Journal of Life Sciences*, **64**, 25-33. <https://doi.org/10.1016/j.njas.2012.10.001>

<sup>43</sup> Sugden, F., Agarwal, B., Leder, S., Saikia, P., Raut, M., Kumar, A. & Ray, D. (2021). Experiments in farmers' collectives in Eastern India and Nepal: Process, benefits, and challenges. *Journal of Agrarian Change*, **21**(1), 90-121. <https://doi.org/10.1111/joac.12369>

<sup>44</sup> Holderness, M., Howard, J., Jouini, I., Templeton, D., Iglesias, C., Molden, D. & Maxted, N. for the CAS Secretariat (CGIAR Advisory Services Shared Secretariat). (2021). Synthesis of Learning from a Decade of CGIAR Research Programs. Rome: CAS Secretariat Evaluation Function. Available at: <https://cas.cgiar.org/evaluation/publications/2021-Synthesis>

<sup>45</sup> Bishaw, Z., Yigezu, Y. A., Niane, A., Telleria, R. J., Najjar, D. (eds). 2019. Political Economy of the Wheat Sector in Morocco: Seed Systems, Varietal Adoption, and Impacts. International Center for Agricultural Research in the Dry Areas, Beirut, Lebanon. 300 pp. <https://hdl.handle.net/20.500.11766/8505>

<sup>46</sup> Yigezu, Y.A., Bishaw, Z., Niane, A., Boughlala, M., El-Shater, T., Aw-Hassan, A., Tadesse, W., Bassi, F. M., Amri, A., & Baum, M. (2021) Farm-level and institutional factors affecting diffusion of new wheat varieties from public and CGIAR centers: A Moroccan case study. *Food Security*, **13**: 1359-1377. <https://doi.org/10.1007/s12571-021-01191-7>

<sup>47</sup> Jarvis, A., Rosenstock, T., Koo, J., Thornton, P., Loboguerrero, A., Govaerts, B., Ramírez-Villegas, J., Prager, S.D., Ghosh, A. & Fuglie, K..(2021) Climate-informed priorities for One CGIAR Regional Integrated Initiatives. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). <https://hdl.handle.net/10568/113289>

<sup>48</sup> Vavilov, N.I. (1992) Origin and geography of cultivated plants. Cambridge University Press. New York, NY, USA.



- 
- <sup>49</sup> Dixon, J.A., Gibbon, D.P. & Gulliver, A. (2001) Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO and World Bank Rome and Washington D.C. Available at: <https://www.fao.org/3/Y1860E/y1860e00.htm?msclid=a3261c3ec7a111ecb2b549d6f7501db3>
- <sup>50</sup> Speilman, D.J. & Smale, M. (2017) Policy options to accelerate variety change among smallholder farmers in South Asia and Africa south of the Sahara. *IFPRI Discussion Paper 1666*. Washington, DC. <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/131364>
- <sup>51</sup> CGIAR – CABI (2015) Crop Improvement, Adoption, and Impact of Improved Varieties in Food Crops in Sub-Saharan Africa. Walker, T.S. & Alwang, J. (eds). CAB International (CABI) Press. Available at: [https://cas.cgiar.org/sites/default/files/pdf/DIIVA\\_book-2015.pdf](https://cas.cgiar.org/sites/default/files/pdf/DIIVA_book-2015.pdf)
- <sup>52</sup> Thurlow, J., Holtemeyer, B., Kassim, Y., Kurdi, S., Randriamamonjy, J., Raouf, M., Elsabbagh, D., Wiebelt, M. & Breisinger, C. (2020) Investing in the agri-food system for post-COVID-19 recovery: An economywide evaluation of public investments in Egypt. *MENA Policy Note 7*. Washington, DC: International Food Policy Research Institute (IFPRI). <https://doi.org/10.2499/p15738coll2.133773>
- <sup>53</sup> El-Shater, T. & Yigezu, Y.A. (2021) Can retention of crop residues on the field be justified on socioeconomic grounds? A case study from the mixed crop-livestock production systems of the Moroccan drylands. *Agronomy*, **11**(8), 1465. <https://doi.org/10.3390/agronomy11081465>
- <sup>54</sup> Yigezu, Y.A. & El-Shater, T. (2021) Socio-economic impacts of zero and reduced tillage in wheat fields of the Moroccan drylands. *Agricultural Economics*. **52** (4), 645–663. <https://doi.org/10.1111/agec.12640>
- <sup>55</sup> Boussios, D. & O'Donoghue, E.J. (2019) Potential variability in commodity support: Agriculture risk coverage and price loss coverage programs. ERR-267, U.S. Department of Agriculture, Economic Research Service. Available at: <https://www.ers.usda.gov/webdocs/publications/93604/err-267.pdf?v=2784.6>
- <sup>56</sup> Devkota, M., Singh, Y., Yigezu, Y.A., Bashour, I., Moussadek, R. & Mrabet, R. (2022) Chapter Five – Conservation Agriculture in the drylands of the Middle East and North Africa (MENA) region: Past trend, current opportunities, challenges and future outlook. *Advances in Agronomy*, **172**, 253-305. <https://doi.org/10.1016/bs.agron.2021.11.001>
- <sup>57</sup> Devkota, M., Patil, S.B., Kumar, S., Kehel, Z. & Wery, J. (2021) Performance of elite genotypes of barley, chickpea, lentil, and wheat under conservation agriculture in Mediterranean rainfed conditions. *Experimental Agriculture*, **57**, 126–143. <https://doi.org/10.1017/S0014479721000107>
- <sup>58</sup> Devkota, M., Singh, Y., Yigezu, Y.A., Bashour, I., Moussadek, R. & Mrabet, R. (2022) Conservation Agriculture in the Drylands of the Middle East and North Africa (MENA) Region: Past Trend, Current Opportunities, Challenges and Future Outlook. *Advances in Agronomy*, **172**, 253-305. <https://doi.org/10.1016/bs.agron.2021.11.001>
- <sup>59</sup> Devkota M., Frija, A., Dhehibi, B., Rudiger, U., Alary, V., M'hamed, H.C., Louahdi, N., Idoudi, Z. & Rekik, M. (2022) Better Crop-Livestock Integration for Enhanced Agricultural System Resilience and Food Security in the Changing Climate: Case Study from Low-Rainfall Areas of North Africa. In: Behnassi M., Baig M.B., Sraïri M.T., Alsheikh A.A., Abu Rishah A.W.A. (eds) Food Security and Climate-Smart Food Systems. Springer, Cham. [https://doi.org/10.1007/978-3-030-92738-7\\_13](https://doi.org/10.1007/978-3-030-92738-7_13)
- <sup>60</sup> Yigezu, Y. A., El-Shater, T., Boughlala, M., Devkota, M., Mrabet, M. & Moussadek, R. (2021) Can an incremental approach be a better option in the dissemination of conservation agriculture? Some socioeconomic justifications from the drylands of Morocco. *Soil and Tillage Research*, **212**. <https://doi.org/10.1016/j.still.2021.105067>



- 
- <sup>61</sup> Beuchelt, T.D. & Badstue, L. (2013) Gender, nutrition- and climate-smart food production: Opportunities and trade-offs. *Food Security* **5**: 709-721. <https://doi.org/10.1007/s12571-013-0290-8>
- <sup>62</sup> Musumba, M., Grabowski, P., Palm, C. & Snapp, S. (2017) Guide for the Sustainable Intensification Assessment Framework. Feed the Future Innovation Lab for Collaborative Research on Sustainable Intensification (SIIL), Kansas State University, Manhattan, Kansas, USA. Available at: <https://www.k-state.edu/siil/resources/framework/index.html>
- <sup>63</sup> Falkenmark, M., & Rockström, J. (2006). The New Blue and Green Water Paradigm: Breaking New Ground for Water Resources Planning and Management. *Journal of Water Resources Planning and Management*, **132**(3). [https://doi.org/10.1061/\(asce\)0733-9496\(2006\)132:3\(129\)](https://doi.org/10.1061/(asce)0733-9496(2006)132:3(129))
- <sup>64</sup> Haddad, M., Strohmeier, S.M., Nouwakpo, K., Rimawi, O., Weltz, M., & Sterk, G. (2022) Rangeland restoration in Jordan: Restoring vegetation cover by water harvesting measures. *International Soil and Water Conservation Research* (in press). <https://doi.org/10.1016/J.ISWCR.2022.03.001>
- <sup>65</sup> Strohmeier, S., Haddad, M., Alwidyan, J., & Dhehibi, B. (2021) Marab - Water Harvesting Based Floodplain Agriculture [Jordan]. WOCAT SLM Database. [https://qcat.wocat.net/en/wocat/technologies/view/technologies\\_5770/](https://qcat.wocat.net/en/wocat/technologies/view/technologies_5770/)
- <sup>66</sup> Verbist, J., Strohmeier, S., & Haddad, M. (2021). Mechanized micro water harvesting through 'Vallerani' tractor plough for central Jordanian Badia [Jordan]. WOCAT SLM Database. [https://qcat.wocat.net/en/wocat/technologies/view/technologies\\_5860/](https://qcat.wocat.net/en/wocat/technologies/view/technologies_5860/)
- <sup>67</sup> Bishaw, Z., & van Gastel, A. J. (2008). ICARDA's seed-delivery approach in less favorable areas through village-based seed enterprises: Conceptual and organizational issues. *Journal of New Seeds*, **9**(1), 68-88. <https://doi.org/10.1080/15228860701879331>
- <sup>68</sup> Bishaw, Z., Makkawi, M., & Niane, A. A. (2009). 22 Seed Quality and Alternative Seed Delivery Systems. *The Lentil*, **350**, 350-367. Available at: [https://www.researchgate.net/publication/286770134\\_Seed\\_quality\\_and\\_alternative\\_seed\\_delivery\\_systems](https://www.researchgate.net/publication/286770134_Seed_quality_and_alternative_seed_delivery_systems)
- <sup>69</sup> Dey, M.M., Paraguas, F. J., Kambewa, P., & Pemsil, D. E. (2010). The impact of integrated aquaculture–agriculture on small-scale farms in Southern Malawi. *Agricultural Economics*, **41**(1), 67-79. <https://doi.org/10.1111/j.1574-0862.2009.00426.x>
- <sup>70</sup> Ahmed, N., Ward, J.D., & Saint, C.P. (2014). Can integrated aquaculture-agriculture (IAA) produce “more crop per drop”? *Food security*, **6**(6), 767-779. <https://doi.org/10.1007/s12571-014-0394-9>
- <sup>71</sup> Diamond, A., D. Tropp, J. Barham, M.F. Muldoon, S. Kiraly, and P. Cantrell. (2014) Food Value Chains: Creating Shared Value to Enhance Marketing Success. U.S. Dept. of Agriculture, Agricultural Marketing Service. <http://dx.doi.org/10.9752/MS141.05-2014>
- <sup>72</sup> USDA. (Accessed 2022) Food Value Chains: Creating Shared Value to Enhance Marketing Success. Agricultural Marketing Service, United States Development Agency (USDA), United States Department of Agriculture. Available at: <https://www.ams.usda.gov/services/local-regional/food-value-chain>
- <sup>73</sup> Deloitte (Accessed 2022) The food value chain: A challenge for the next century. Available at: <https://www2.deloitte.com/tw/en/pages/consumer-business/articles/food-value-chain.html>