

# CALL FOR AN AFRICAN WATER REVOLUTION

## Outcome from the Malin Falkenmark Symposium at World Water Week in Stockholm 2016: A Triple Green Future for Humanity

Humanity faces daunting water challenges in the Anthropocene. Water scarcity and shocks linked to hydro-climate, anthropogenic climate change and rapidly rising demographic pressure on water, makes it imperative for the world to place a top priority on water to attain the Sustainable Development Goals (SDGs).

Moreover, success requires a deep mind-shift from the predominant blue (liquid) water paradigm, to an integrated green and blue water paradigm that builds water resilience. Green water is the part of the rainfall that is retained in the soil, and which provides at least 70% of freshwater use for food production in the world through rain-fed agriculture.

Africa is the global Ground Zero in terms of problems funneling. About 40% of sub-Saharan Africa is semi-arid or dry sub-humid; climate change, and ecosystem degradation creates major water shocks on a continent with a population projected to grow from 1 billion to up to 3 billion this century. Reaching SDG 2 (End hunger, achieve food security and improved nutrition, and promote sustainable agriculture), requires massive, continental-scale efforts to secure food for a population, which for only semiarid and dry sub-humid regions will likely approach 900 million by the end of the Agenda 2030 period.

**It will NOT be possible to reach the SDGs in Africa without an AFRICAN WATER REVOLUTION - based on green water - that builds water resilience for sustainable development.**



**To attain Sustainable Development Goal 2, the following actions are essential:**

1. We identify a need for a sufficiently resourced, long-term, and continental-scale innovation and implementation plan for a sustainable transformation towards productive and resilient agricultural systems across sub-Saharan Africa. We suggest a GREEN WATER INITIATIVE FOR AFRICA to lead the path towards achieving the food security and hunger alleviation goal, which in turn is a precondition for all the other SDGs.
2. We propose a WATER HARVESTING INNOVATION COORDINATION MECHANISM FOR AFRICA under pan-African ownership, to coordinate investments public and private - funded by domestic and international resources. As a strategic African Green Water Plan, a minimum of USD 100 billion investments in green water innovations will be needed to build water resilience for food security and human wellbeing, and to incentivize the business community to invest in small-scale farming innovations and catalyze a Triple Green Revolution in Africa.

We see the need for Africa to spark a TRIPLE GREEN REVOLUTION (green for green water, green for productivity, green for sustainability). Rain is the core resource for securing reliable food production in the huge semi-arid and dry sub-humid African drylands. Science clearly shows the necessity of a sustainable, resilience-based agricultural revolution with special focus on water resilience in the vast water-scarce regions in Africa.

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## Endorsed by:

*Malin Falkenmark, Stockholm International Water Institute and Stockholm Resilience Centre*  
*Johan Rockström, Stockholm Resilience Centre*  
*Torgny Holmgren, Stockholm International Water Institute*  
*Johan Kuylenstierna, Stockholm Environment Institute*  
*Kevin Chika Urama, African Development Bank* *Charles Vörösmarty, City University of New York*  
*Daniel Tsegai, United Nations Convention to Combat Desertification (UNCCD)*  
*Oyun Sanjaasuren, Global Water Partnership.* *Tom Soo, World Water Council*  
*Shenggen Fan, International Food Policy Research Institute*

**Stage-Setting.** Addressing Goal 2 in the SDG Agenda 2030 of alleviating hunger with healthy and sustainable food, the “Triple Green Future for Humanity Symposium” paid particular attention to the grand challenge in Africa, with a particular emphasis on water, given its absence in the adopted Goal 2 protocols.

**1. Water scarcity stumbling block for global development**

Africa stands out as one of the most vulnerable of the three water scarce world regions, where food production and human livelihoods rely on limited, highly variable, unreliable and unpredictable rain. Water shocks, in terms of droughts, dry spells and floods are normality, and accentuated by anthropogenic global environmental change. Since conventional solutions for addressing poverty and hunger used earlier in Asia, relying on runoff water and irrigation may not work in water scarce savannah areas, (semi-arid and dry sub-humid regions) covering > 40 % of the region and hosting ~40 % of the population, direct management of scarce rainfall must form an integral part of the development agenda (Fig.1). Water resources also encompass lateral flows through river corridors, with 2/3 of all Africans – most in the arid and semi-arid sub-regions of the continent – experiencing river discharges that are highly limited, variable and unpredictable.

**2. Water key to attain SDGs, particularly Goal 2 on food and hunger**

African landscapes are largely dominated by savannahs with potential evaporation vastly exceeding rainfall. The runoff generation is low and most rain evaporates on its way to the river. Only some 30 % of rainfall is used as productive green water flow in crop production, with 50 % being lost as evaporation, resulting in very low crop yields (some 1 ton/ha only on average in SSA). In the semiarid and dry sub-humid zones, population growth is very rapid and may by 2030 be hosting close to 900 Mp, by 2050 some 1300 Mp – “a new India!”

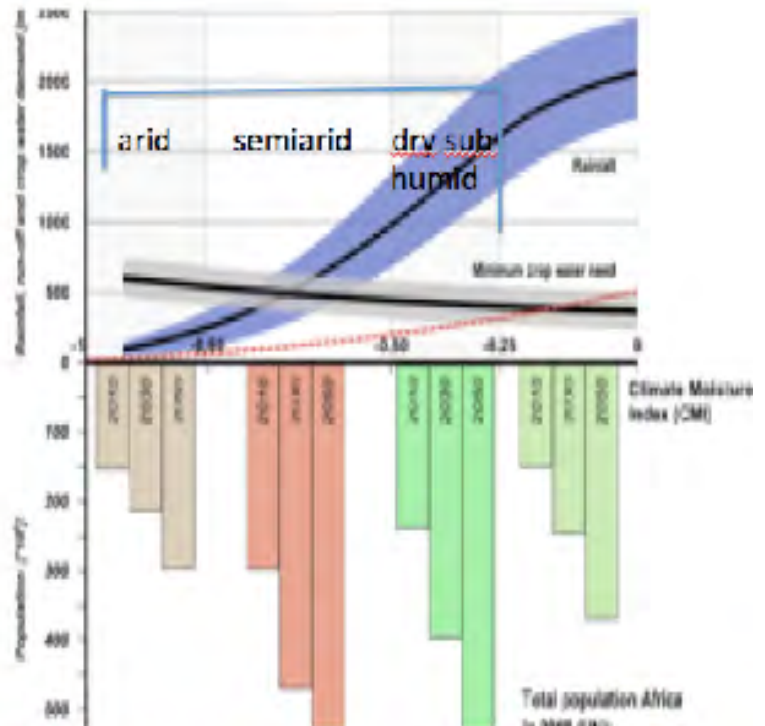
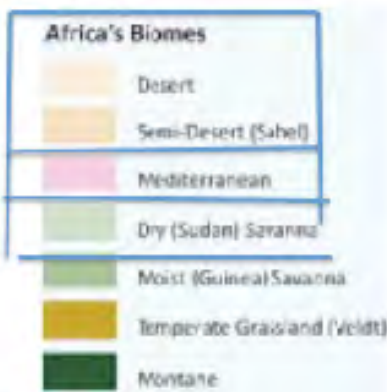
**3. Shift in thinking essential**

A water mind-shift from blue-only to an integrated green-blue water strategy is necessary to untap the potential of building water resilience for food and livelihoods in water scarce regions. A green water initiative is needed to upgrade rain-fed agriculture.

We propose this as a new Triple Green Revolution: green for productive use of green water (rain); green for intensification and enhanced food production; and green for sustainability and building water resilience in watersheds and river basins. Rain is the ultimate water resource in dryland agriculture. The limited and highly variable blue water in rivers and aquifers will be needed for urban water supply, for industry, and for energy production.

An integrated green-blue water paradigm for SDG delivery is

## Dryland hotspot region



**2050: 300Mp 670M 600Mp 350Mp**

Fig 1, The hydroclimatic Achilles Heel in sub-Saharan Africa. Source: Falkenmark & Rockström 2015

an innovation and livelihood pathway to build social-ecological resilience for human wellbeing in light of anticipated proliferation of water shocks. Water resilience includes integrated ecosystem management to safeguard ecological functions (e.g. moisture feedback) and ecosystem services (e.g., pollination and soil biology).

#### 4. Green water the only way to deliver Goal 2 in Africa

Rain is a core resource for securing reliable food production to alleviate hunger in the semi-arid and dry sub-humid African drylands. The considerable water losses in current rain-fed agriculture will have to be met by agricultural upgrading, turning non-productive evaporation into productive transpiration (vapour shift), and from water harvesting systems providing supplementary irrigation based on rain water flows, harvested from slopes and valley bottoms and stored in ponds or dams for use during dry spells and drought periods. This potential is vast, with e.g., hopespots where such simple technology can be applied by many smallholder farms already identified (Fig 2).

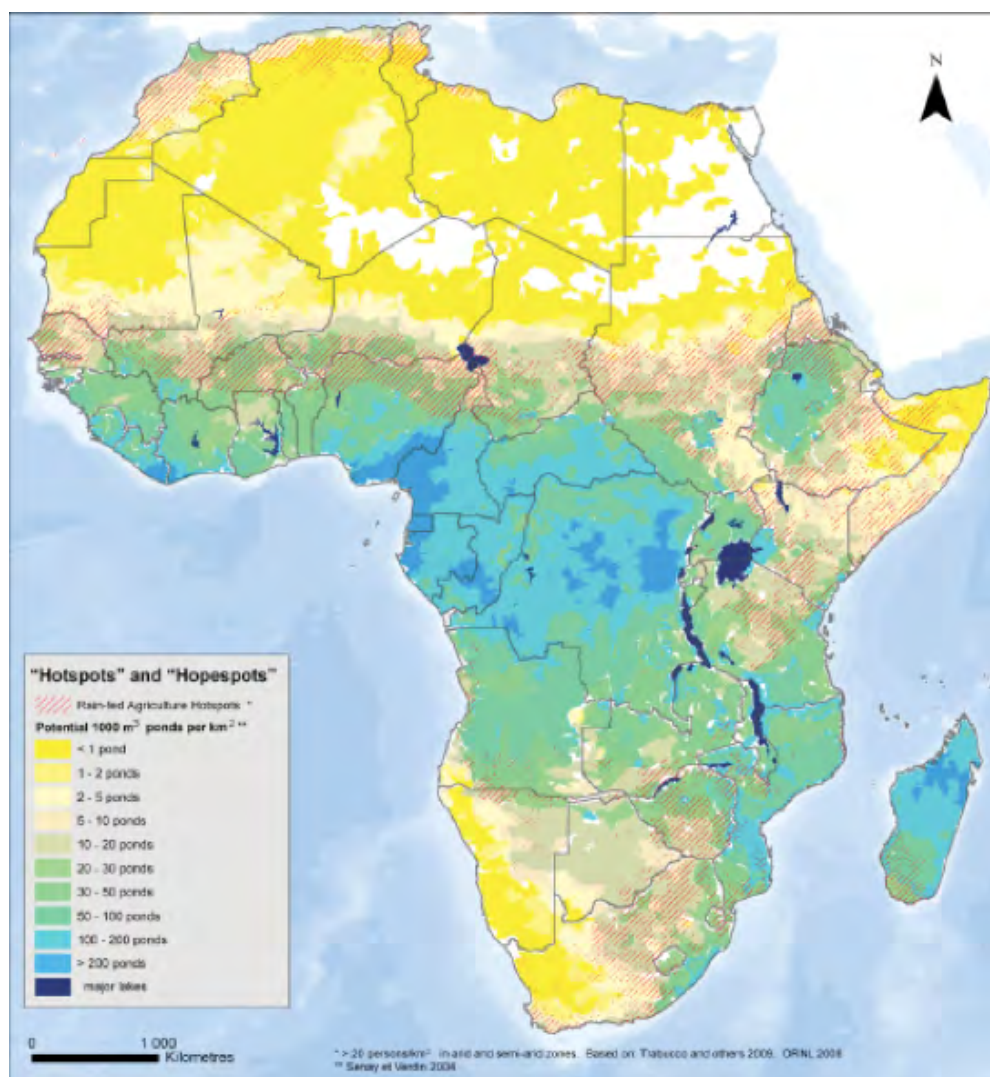
#### 5. Largest challenge in Africa – from 1 billion in 2010 to 2 billion people by 2050

To reach Goal 2 in Africa means a truly continental-scale effort to secure food for a population, only in semi-arid and dry sub-humid regions expected to increase to almost 900 million by the end of the SDG Agenda 2030 and in the following 20

years another 400 million citizens. Solutions of this scale in the next 15 years will not be possible without continental scale perspectives. In this context, there are several additional constraints. First, technical capacity is limited; prior investments in water management systems have been demonstrated to be “stranded” across SSA, due to poor implementation and maintenance. Training a next generation of practitioners who can forward the principles of any Triple Green Revolution are currently absent.

Next, reporting and monitoring systems are essential to assessing the trajectories of benefits flowing from financial investments in food security systems; however, across Africa such networks are either non-consistent or in severe decline, non-systematic, and suffer potentially from politicized reporting systems.

Further, there will be increased impetus to establish investments in traditional so-called “hard-path” technologies to deliver water security in the food sector, yet these systems are costly and thus promote indebtedness among the poorest of nations. They also destroy environmental systems that have been clearly shown to provide essential public goods and services, thus lowering the costs of traditional water management investments. Collateral damage to biodiversity has been a poorly articulated element of the food security question, with the allied loss of functional diversity compromising the long-term stability of landscapes and soil, which constitute the essence of sustainable food systems.



**Fig 2. Hopespots (red) where simple water harvesting technology can be applied by many smallholder farms have been identified.**  
**Source: Africa Water Atlas UNEP 2000**

