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A call for a new business model valuing water use and production: the Water, Energy and Food Nexus holistic system approach

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Looking back on the last 11 years of the Nexus journey (Assi, Accola, Hovhannissian, Mohtar, & Braudeau, 2014; Braudeau & Mohtar, 2014; Daher & Mohtar, 2015; Mohtar, 2015; Mohtar, Assi, & Daher, 2017; Mohtar & Daher, 2014; Mohtar & Lawford, 2016), I'd like sum up what we have learned from the Nexus and how we should use it to move towards sustainable water use and production. The last few days many of us have been talking about how to use policies and new technologies to bridge the research gaps that we face. Often this has been framed in terms of water efficiency. Let me confess to you that efficiency alone is not going to be enough. Yes, we need greater efficiency if we are to move forward; but it is not sufficient. We need a new business model for water use and production, one that incorporates but also goes well beyond water efficiency, technological solutions, and innovation.

Several presentations here at the Congress have clearly demonstrated that there is a projected resource gap. Actually there are several water-energy-food resource gaps, and

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Remarks at the Awards Ceremony, Cancún, Mexico, 1 June 2017. The recipient of the Ven Te Chow Lecture award this year was Prof. V. P. Singh of Texas A&M University. Unfortunately, for health reasons, Professor Singh was unable to attend. Professor Mohtar, Ven Te Chow Lecture awardee at the previous Congress, and a colleague of Professor Singh, accepted the award on the behalf of the latter, and in addition to reading a statement from Professor Singh, offered the additional remarks that, with some editing, are presented here. Professor Singh's prepared full address, 'Challenges in Meeting Water Security and Resilience', has been published in *Water International*, 42, 349-359.

there can be no denying the existence of these gaps. We can argue about whether we need to double the food supply or whether we have a 40 or 60 or 70 per cent water gap or energy gap; we can argue about the extent of the gap, but the reality remains that we do have a gap.

Another unfortunate reality is that most of our communities have no resilience to climate change. The high-level panel on climate change on the first day of this Congress made it clear; we have seen this problem come up again and again in the subsequent panels. There is a justice gap as well: inequities in the distribution of water, energy and food are serious and, more often than not, are growing. We cannot ignore this problem in the pursuit of efficiency. Last but not least, are the trade-offs among the primary resources, especially in global Nexus hotspots. While these trade-offs vary spatially and in degree and nature around the world, imbedded in them everywhere is the model that we have used traditionally, and continue to use, to allocate food, water, energy and other primary resources. This model divides resources among stakeholders and users based on allocation criteria that vary with social values, historical rights, and in many cases, economic return. This model has already failed in many parts of the world, and it will continue to lead to conflict within and across national boundaries. Some of us in the Nexus community have become quite concerned about the potential of conflict in these trade-offs. So, where we are today does not offer a pretty picture. Where can we turn?

I'd like to suggest a new business model, but one that works with the levers that we already have. We have rapidly advancing engineering technologies that have promoted a culture of innovation. We have social awareness, financial levers, and perhaps we also have political awareness. These four levers are the tools that will allow the private sector, the public sector and the civil society to work together to achieve.

In addition to these four levers, I see four elements of particular relevance:

(1) *Create synergy*. The Nexus has shown us interlinkages; these can allow us to create synergies between water, food and energy.
(2) *Reduce interdependencies*. Ironically, while creating synergies we must also decouple interdependencies between the elements of the Nexus, because reduced interdependence means increased resilience.
(3) *Improve equity and distribution*. We all know that we cannot have the world split into those who have and those who do not; therefore, we need to work harder to improve the equity of distribution, including recognition of the human right to water.
(4) *Localize water, energy and food security* – a critical factor in achieving the first three points.

Figure 1 shows the elements of this proposed new business model.

I have a degree in irrigation engineering. I have spent a large part of my career working on irrigation systems – their efficiency and technologies. I have learned that efficiency alone will not solve the problem. We must *go beyond efficiency and look into productivity*. Our business model must consider water use, energy use, land degradation, human factors, and pollution, both environmental and ecosystem.

Figure 2 describes some of the value-based resource management. I offer here a few examples of the creation of the mentioned synergy and will focus on three areas. Our business model in food production is failing; we need a different model of water for food, one that is based on efficiency. We must encourage *technological advancement*

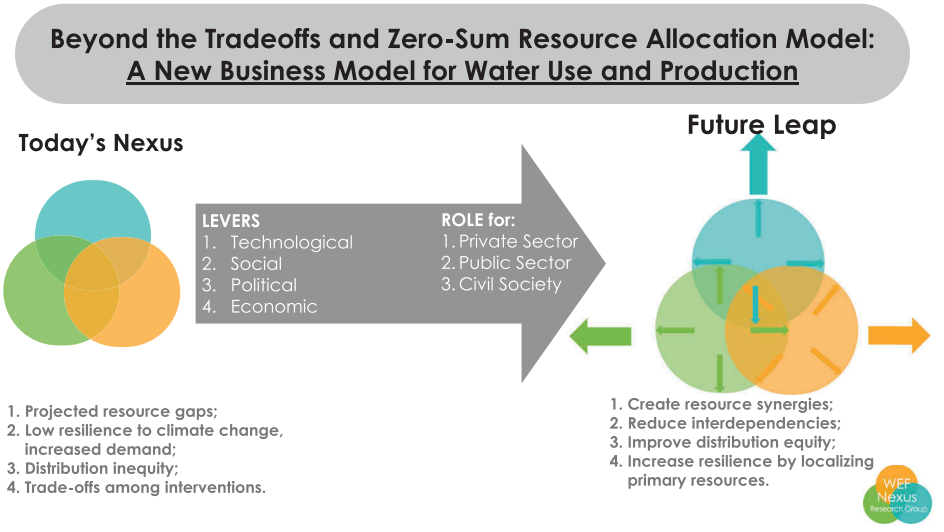

Figure 1. A new business model for water use and production.

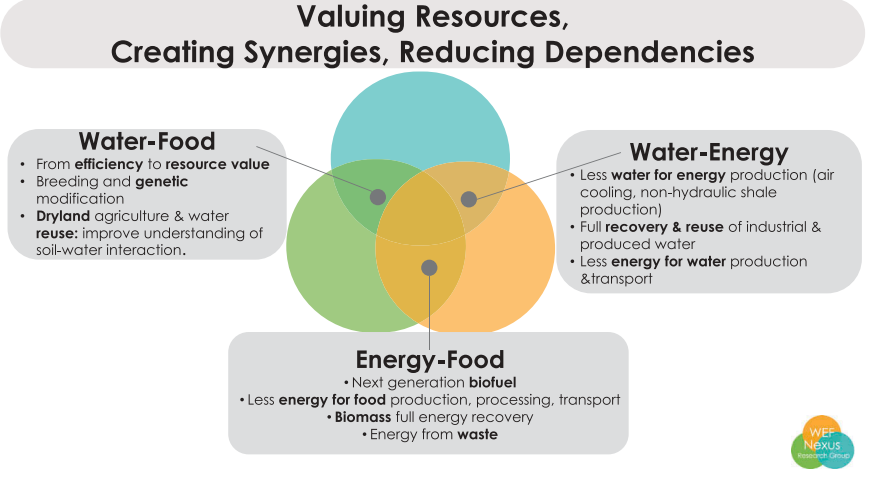

Figure 2. Examples of synergies between water, energy and food resources.

that allows localization of resources: localizing resources increases resilience. Solar energy, for example, allows the deployment of off-grid energy to be used for the production of water in food production.

Water reuse in agriculture comes at a cost: soil is an important element that catalyzes the water and food; the soil system needs to be understood at a much deeper level than at present. Existing soil technologies rely on soil monitoring: the current soil database is a 60-year-old technology. We need new, different mechanisms that characterize the soil dynamically so that we can understand how soil is impacted by water use. We must use the *fundamental soil-water relationships to better understand the soil-water interaction* in a way that allows us to better use dryland agriculture. Two-thirds of our food comes

from dryland farming. Promoting a better understanding of soil–water relationships, in simple, straightforward language, will empower growers.

In the world of energy, I'd like us to focus on energy and food. We need to move beyond the current biofuel model into a more 'next-generation' biofuel model, looking, for example, at coastal cities, which utilize waste for regenerative energy. We must *decouple water and energy*: 'de-water' our energy supply, and 'de-carbon' our water supply. There are many, many examples of this, and I would highlight one. We have all been fascinated by hydropower. Let us think towards micro-hydropower, which does not impact the environment, but uses the waste effluent of power plants from the energy supply.

To answer the question of 'How do we get there?': by working together to encourage private-sector innovation and responsible investment; by demanding that the public sector offer new policies that protect and promote this new business model; and finally, by recognizing that each of us, as concerned citizens in civil society, must grab an oar and help create a public awareness that allows us to move into this new model moving forward.

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