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Short Communication

The needs and challenges for water footprinting in arid regions

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Climate change has left its traces on the planet in the last 3 decades. Most of the influenced areas were occupied in the Middle East which was degraded to desertification phenomena today. The per capita share of renewable water has been reduced to less than the poverty line of 1,000 m^3/(capita) and in some Arab countries, to less than the extreme poverty line of 500 m^3/(capita). However, people started rethinking water conservation practices and water-saving techniques to increase water efficiency [1]. Water consumption in both agriculture and industry became a major factor in environmental degradation as it tried to replace natural processes with technology [2]. Severe environmental problems from water pollution showed many problems which continue worldwide without real improvement. Water footprinting measures the amount of water used to produce each of the goods and services we use. Yet, it has not proven as a practical solution for widespread adoption, and it has still a major problem with water consumption and water pollution as well as the adaptation to climate change. In this research paper on water footprinting, many “best practices” were promoted. Terms like Eco agriculture, agroecology and more recently regenerative measurements became fashionable. Yet, in several definitions, those terms are mostly described, like the term “water footprinting” the desired outcome without specifying how exactly that could be reached. Also, most of these approaches focused on the problems of the water economy assuming that the uses of synthetic inputs like chemicals and fertilizers were the core problem. A different approach took the development of “water recycling”, which became popular in the late 1990ies and developed into a worldwide movement in the new millennium [3]. It developed out of the problems of water scarcity, mainly in the MENA region. To make water conservation and water recycling, additional elements had to be added, which were finally coined into the three principles of water conservation:

1. Minimum or no pollution of the water, i.e., no chemicals throughout the water cycle.
2. Decreasing water losses such as intensive irrigation, old irrigation techniques, or noncollecting rainwater harvest.
3. Integrating water nets, and expansion in water use associations, water authorities, and companies.

The water footprinting can be complemented using inputs in a way that they do not interfere with or interrupt the biological ecosystem functions. The integration of sustainability approaches is also a way for integration; in this sense, sustainability should be used as a key function in local production to close the water cycles as much as possible. Also, the integration of water management, for example as reuse of drained water from agro-industries with irrigation operations is beneficial for the ecosystem as well as for farm economics and completely compatible with water conservation. Now there are more practical and large-scale experiences available with this system [4,5]. Scientific research to understand the processes of the water footprinting system and to optimize it was carried out mainly in The Netherlands, Brazil, and later also in some Asian countries, such as India and China. These experiences showed that water footprinting correctly applied can lead to truly sustainable development, in a way that does not leave a permanent footprint in the environment [3]. Each intervention is only done to a point that the environment can recover to its previous stage before the next intervention. Natural resources such as soil, air, and water are not only “less degraded”, but they are enhanced and can recover to their original states. Soil carbon is enhanced; water cycles are recovered [6]. Research has shown that the development of models to assess consumptive water use has been an important development and continues to be a priority, the most common approach has involved the use of the Water Stress Index (WSI) which can be used to calculate a water footprint whereby the result is reported relative to an equivalent volume of water consumption at the global average WSI, which follows a logistic function ranging from 0.01 to 1 [7] and is based on the local freshwater withdrawal-to-availability ratio with various adjustments. A file containing WSI values at the watershed level is publicly available for use on Google Earth (http://www.ifu.ethz.ch/ESD/downloads/EI99plus). The thinking behind the WSI is that greater potential for environmental harm exists when consumptive water use occurs in locations of high water stress compared to locations of low water stress [7]. Even though, the necessary water savings and conservation technologies are developed and available such as shower regulators, toilet tank fill cycle diverters, irrigation controls, rain sensors, water flow management devices and leak detection systems. These technologies are mostly unknown worldwide and only in very few countries promoted by supportive policies [8]. Therefore, several actions should be incorporated into a series of integrated water conservation programs. Strong political support and adequate capacity (human, institutional and enabling environment) are essential to facilitate the implementation of these programs. It is also necessary to increase public awareness of politicians and society on water scarcity and its implications, as well as emphasize the need to apply water footprinting accreditations values of water conservation.

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