Water & Biofuels - Glossary of Terms[1]

Blue water – Fresh surface and groundwater, i.e., the water in freshwater lakes, rivers and aquifers.

Blue water availability – Runoff (through groundwater and rivers) minus environmental flow requirements. Blue water availability typically varies within the year and from year to year as well.

Blue water footprint – Volume of surface and groundwater consumed as a result of the production of a good or service. Consumption refers to the volume of freshwater used and then evaporated or incorporated into a product. It also includes water abstracted from surface or groundwater in a catchment and returned to another catchment or the sea. It is the amount of water abstracted from ground or surface water that does not return to the catchment from which it was withdrawn.

Blue water scarcity – The ratio of blue water footprint to blue water availability. Blue water scarcity varies within the year, as well as from year to year.

Business water footprint – See "water footprint of a business."

Corporate water footprint – See "water footprint of a business."

Crop water requirement – The total water needed for evapotranspiration, from planting to harvest for a given crop in a specific climate region, when adequate soil water is maintained by rainfall and/or irrigation so it does not limit plant growth and crop yield.

Crop yield – Weight of harvested crop per unit of harvested area.

Direct water footprint – The freshwater consumption and pollution associated with the water use by the consumer or producer. It is distinct from the indirect water footprint, which refers to the water consumption and pollution associated with the production of the goods and services used by the consumer or the inputs used by the producer.

Economic water productivity – Economic value of the products produced per unit of water consumption or pollution. See also "water productivity."

Ecosystem – A dynamic complex of communities of living organisms and their non-living environment interacting as a functional unit.

Ecosystem services – The benefits (direct and indirect) that people obtain from ecosystems.

Effective precipitation – The portion of the total precipitation retained by the soil so it is available for crop production.

Environmental flow requirements – The quantity, quality, and timing of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems.

Evapotranspiration – Evaporation from the soil and soil surface where crops are grown, including the transpiration of water that actually passes through crops.

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[1] Much of this glossary has been copied with permission from: Hoekstra, A.Y., Chapagain, A.K., Aldaya, M.M. and Mekonnen, M.M. (2009) *Water footprint manual: State of the art 2009, Water Footprint Network, Enschede, the Netherlands.*

External water footprint of national consumption – The part of the water footprint of national consumption that falls outside the nation considered. It refers to the appropriation of water resources in other nations for the production of goods and services imported into and consumed within the nation considered

Global water saving through trade – International trade can save freshwater globally if a water-intensive commodity is traded from an area where it is produced with high water productivity (small water footprint) to an area with lower water productivity (large water footprint).

Green water – The precipitation on land that does not run off or recharge the groundwater, but is stored in the soil or temporarily stays on top of the soil or vegetation. Eventually, this part of precipitation evaporates or transpires through plants. Green water can be made productive for crop growth (but not all green water can be taken up by crops, because there will always be evaporation from the soil and because not all periods of the year or areas are suitable for crop growth).

Green water availability – The evapotranspiration of rainwater from land minus evapotranspiration from land reserved for natural vegetation and minus evapotranspiration from land that cannot be made productive.

Green water footprint – Volume of rainwater consumed during the production process. This is particularly relevant for agricultural and forestry products (products based on crops or wood), where it refers to the total rainwater evapotranspiration (from fields and plantations) plus the water incorporated into the harvested crop or wood.

Green water scarcity – The ratio of green water footprint to green water availability. Green water scarcity varies within the year and from year to year.

Grey water footprint – The grey water footprint of a product is an indicator of freshwater pollution associated with the production of a product over its full supply chain. It is defined as the volume of freshwater required to assimilate the load of pollutants based on existing ambient water quality standards. It is calculated as the volume of water required to dilute pollutants to such an extent that the quality of the water remains above agreed water quality standards.

Hotspot identification – The process of identifying "water footprint hotspots" in space and time based on two criteria: (1) the water footprint of a product, consumer, or producer is significant in this area and time of the year, and (2) problems of water scarcity and pollution occur in this area during this time of the year. The hotspots are associated with particular components in the total water footprint of the product, consumer, or producer. Hotspots deserve the most attention when formulating response measures.

Indirect water footprint – The indirect water footprint of a consumer or producer refers to the freshwater consumption and pollution *behind* products being consumed or produced. It is equal to the sum of the water footprints of all products consumed by the consumer or of all non-water inputs used by the producer.

Internal water footprint of national consumption – The part of the water footprint of national consumption that falls inside the nation, i.e., the appropriation of domestic water resources for producing goods and services consumed domestically.

Irrigation requirement - The quantity of water exclusive of precipitation, i.e., quantity of irrigation water required for normal crop production. It includes soil evaporation and some unavoidable losses under the given conditions. It is usually expressed in water-depth units (millimeters) and may be stated in monthly, seasonal, or annual terms or for a crop period.

National water footprint – Is the same as what is more accurately called the ”water footprint of national consumption,” which is the total amount of fresh water used to produce the goods and services consumed by the inhabitants of the nation. Part of this water footprint, however, lies outside the territory of the nation. The term should not be confused with the ”water footprint within a nation,” which refers to the total freshwater volume consumed or polluted within the territory of a given nation.

National water saving through trade – A nation can preserve its domestic freshwater resources by importing a water-intensive product instead of producing it domestically.

Operational water footprint of a business – The operational (or direct) water footprint of a business is the volume of freshwater consumed or polluted due to its operations.

Overhead water footprint – The water footprint of a product consists of two elements: the use of freshwater immediately related to the product and the use of freshwater in overhead activities. The latter element is called the ”overhead water footprint.” The overhead water footprint refers to freshwater use that cannot be fully associated with production of the specific product considered, but is associated with supporting activities and materials used in the business and involved in producing not just the product under consideration, but other products as well. The overhead water footprint of a business must be distributed over the various business products, which is done based on the relative value per product. The overhead water footprint includes, for example, the freshwater use in the toilets and kitchen of a factory and the freshwater used to manufacture the concrete and steel used in the factory and machineries.

Production system – A production system consists of all the sequential process steps applied to produce the product. A production system can be a linear chain of processes, it can take the shape of a product tree (many inputs ultimately resulting in one output product), or it may appear as a complex network of interlinked processes that eventually lead to one or more products.

Renewable water resources – Total water resources offered by the average annual natural inflow and runoff that feed each hydrosystem (watershed or aquifer).

Return flow – The part of the water withdrawn for an agricultural, industrial, or domestic purpose that returns to the ground or surface water in the same catchment from which it was abstracted. This water can potentially be withdrawn and used again.

Supply-chain water footprint of a business – The supply-chain (or indirect) water footprint of a business is the volume of freshwater consumed or polluted to produce all the goods and services that form the input of production.

Virtual-water balance – The virtual-water balance of a geographically delineated area (e.g., a nation or catchment area) over a certain time period is defined as the net import of virtual water over this period, which is equal to the gross import of virtual water minus the gross export. A positive virtual-water balance implies net inflow of virtual water to the nation from other nations. A negative balance means net outflow of virtual water.

Virtual-water content – The content of a product is the volume of water used to produce the product, measured at the place where the product was actually produced.

Water consumption – The volume of freshwater used and then evaporated or incorporated into a product. It also includes water abstracted from surface or groundwater in a catchment and returned to another catchment or the sea.

Water footprint – The water footprint is an indicator of freshwater use that looks at both direct and indirect water use of a consumer or producer. The water footprint of an individual,

community, or business is defined as the total volume of freshwater used to produce the goods and services consumed by the individual or community or produced by the business. Water use is measured in terms of water volume consumed (evaporated) and/or polluted per unit of time. A water footprint can be calculated for a particular product, for any well-defined group of consumers (e.g., an individual, family, village, city, province, state, or nation) or producers (e.g., a public organization, private enterprise, or economic sector). The water footprint is a geographically explicit indicator, not only showing volume of water use and pollution, but also locations.

Water footprint accounting – The step in water footprint assessment that refers to collecting factual, empirical data on water footprints with a scope and depth as defined earlier.

Water footprint assessment – Quantifying a water footprint, assessing its impacts, and formulating a response. The assessment includes four phases: setting goals and scope; water footprint accounting; water footprint sustainability assessment; and water footprint response formulation.

Water footprint of a business – The total volume of freshwater that is used directly and indirectly to run and support a business. The water footprint of a business consists of two components: the direct water use by the producer (for producing/manufacturing or for supporting activities) and the indirect water use (the water used in the producer's supply chain). The "water footprint of a business" is the same as the total "water footprint of the business output products."

Water footprint of a product – The total volume of freshwater used to produce the product (a commodity, good or service), summed over the various steps of the production chain. The water footprint of a product refers not only to the total volume of water used, but also refers to where and when the water is used.

Water footprint sustainability assessment – Assessing the sustainability of a water footprint from an environmental, social, and economic perspective, at the local river basin level, as well as globally.

Water footprint within a geographically delineated area – The total freshwater consumption and pollution within the boundaries of the area. The area can, for example, be a hydrological unit like a catchment area or a river basin or an administrative unit like a municipality, province, state, or nation.

Water intensity – Usually taken to be the ratio between a process, product, business, or human freshwater use and a defined unit of production or population. In some cases, "use" is replaced by "consumption."

Water neutral – A process, product, consumer, community or business is water neutral when (1) its water footprint has been avoided and reduced where possible, particularly in places with a high degree of water scarcity or pollution, and (2) when the negative environmental, social, and economic externalities of the remaining water footprint have been offset (compensated). In some cases, when interference with the water cycle can be completely avoided—e.g., by full water recycling and zero waste—"water neutral" means that the water footprint is nullified; in other cases, such as crop growth, the water footprint cannot be nullified. Therefore "water neutral" does not necessarily mean the water footprint is brought down to zero, but means it is reduced as much as possible and the negative economic, social, and environmental externalities of the remaining water footprint are fully compensated.

Water offsetting – Offsetting the negative impacts of a water footprint is part of water neutrality. Offsetting is a last step, after a prior effort of avoiding and reducing a water footprint and its

impacts. Compensation can be done by contributing to (e.g., investing in) a more sustainable and equitable use of water in the hydrological units in which the impacts of the remaining water footprint are located.

Water pollution level – Degree of pollution of the runoff flow, measured as the fraction of the pollution assimilation capacity of runoff actually consumed. A water pollution level of one hundred percent means that the pollution assimilation capacity of the runoff flow has been fully consumed.

Water scarcity – Physical water scarcity occurs when the use of water resources is approaching or has exceeded sustainable limits. Economic water scarcity occurs when human, institutional, and financial capital limit access to water, even though water in nature is available locally to meet human demands. See also "blue water scarcity" and "green water scarcity."

Water self-sufficiency vs. water dependency of a nation – The "water self-sufficiency" of a nation is defined as the ratio of the internal to the total water footprint of national consumption. It denotes the degree to which the nation supplies the water needed for the production of the domestic demand for goods and services. Self-sufficiency is one hundred percent if all the water needed is available and also taken from within the nation's own territory. The water self-sufficiency of a nation approaches zero if the demand for goods and services is largely met with virtual-water imports. Nations with import of virtual water depend, *de facto*, on the water resources available in other parts of the world. The "virtual-water import dependency" of a nation is defined as the ratio of the external to the total water footprint of national consumption. [You might want to include a definition of "virtual-water import dependency."

Water stress – The condition under which renewable water resources are less than 1,700 cubic meters per person per year, characterized by periodic water shortages. It is, however, as dependent on water demand as on the amount of water actually available.

Water withdrawal – Removal of water from any source, either permanently or temporarily. Water withdrawn, however, might not actually be *consumed.*

Watershed – Area of land having a common outlet for its surface water runoff.