TAGMI Glossary

Terms

Agricultural water management (AWM): "AWM is the activity of planning, developing, distributing and managing the optimum use of water resources for agricultural purposes, through a suite of strategies" (Douxchamps et al 2012, p1)

AWM Technology: an agricultural water management technology changes the partitioning of water when reaching the soil surface, and can be *in-situ* (including most soil and water conservation technologies) or *ex-situ* (including small reservoirs and small scale irrigation). The source of water for AWM technologies can be rainwater harvesting, groundwater, relocated stream flow or recycled water. (Barron et al 2009, p2)

Best Practice Factors also affect the likelihood that a technology will be successful, but are related to decisions made by the implementer through the design of the project and process of implementation (e.g. level of engagement with the community, prior relationship with the community leaders). These decisions can also affect the Context Factors e.g. capacity building can improve socio-economic and institutional factors; the strategy of implementation, targeting and participation of beneficiaries can affect *who* benefits, and therefore have mixed effects on the context. Best Practice characteristics can affect the context during and after the running time of the project; indeed, often the aim of the project is to positively affect the background context. How well the project is designed, planned and implemented dictates how much the background context is affected, and whether the effect is positive or negative.

Conservation agriculture (CA): CA is a soil and water conservation strategy with three key tenets: no tillage, permanent soil cover (e.g. using crop residues) and crop diversification using rotation and/or intercropping.

Context Factor is a characteristic of a project site that was present before the project started and is outside the control of the project (e.g. biophysical characteristics - rainfall, institutional characteristics - government policies, socio-economic characteristics - income, skills, health). The model further groups **Context Factors** into five categories of 'assets' of 'capitals' using the Sustainable Livelihoods Framework (DFID, 1999; Scoones, 1998): Social, Human, Physical, Financial, Natural:

- **Social capital** is the set of networks and relationships that support coordinated strategies for achieving livelihood goals.
- **Human capital** is individual skills and knowledge, as well as health and physical ability that can be mobilized in livelihood strategies.
- **Physical capital** is the infrastructure, equipment, and other long-lived physical goods that people, households, and communities can bring into use.
- **Financial capital** is the pool of economic assets, including savings, cash or other liquid assets, and credit.
- **Natural capital** is the natural resource stocks and services that can be used to support livelihood outcomes, including soil, water, genetic variability, and pollution sinks (Kemp-Benedict et al. 2010).

.

Factor [of success]: The web-tool's Bayesian Model is driven by a group of **Factors** of Success, or a circumstance, fact, or influence that contributes to the successful implementation, adoption and out-scaling of an AWM technology. In general, factors affecting success are both those related to the "**Context**" (outside of the implementer's control) and those related to "**Best Practice**" (inside the implementer's control). The model currently only includes "Context" Factors.

Indicator (Data): used to convey the presence of a given factor. It conveys the state or level of a factor, and in this case they act as proxy variables to convey the presence of given factor of success. Indicators have a number, or quantity that increases or decreases over time. The data supporting each Indicator has been documented to provide a sense of the representativeness of the maps displayed.

Likelihood of success: Low - Medium - High This is the end result of the model calculation, and indicates the likelihood that an AWM project implemented in that district will be successful. The result is formed by the interaction of varying levels of the important influencing factors (e.g. rainfall, land, labour, infrastructure or skills). For example, if all important factors are present at high levels, the likelihood of success will be High. If all important factors are low the likelihood of success will be low. If some are high and some are low, then the result depends on how relatively influential each factor is, and how they interact with each other; this is where the need for the model becomes apparent.

Small reservoirs: Small reservoirs are *ex-situ* structures of earth, stone or concrete, that capture and store run-off at the macro-catchment level, and range in surface area from 3 to 30 ha (Douxchamps et al 2012), dam walls up to 8m high, and storage volume up to 1 million m3 (Senzanje et al 2008). They have multiple uses: supplementary irrigation during dry spells, dry season irrigation, fishing, livestock and household watering, and groundwater recharge through decreasing run-off. In contrast to the individually-managed *in-situ* AWM strategies, small reservoirs benefit the whole community and therefore require a strong management structure usually in the form of farmers' or village organizations to be in place in order to be effective. Communal efforts and management are necessary for construction, maintenance and water allocation (Douxchamps et al 2012). "Small reservoirs are classified into two sub-groups namely, small dams and dugouts, according to their size, priority of water use, structural details and their management system (Namara et al., 2010). Small dams are barriers that impound permanent or temporary rivers. Depending on the topography of the watershed, small dams will be placed in the gully to retain run-off downstream. They can be made of concrete, rocks or earth, with or without spillway, permeable or not, depending on the purpose of the dam. Dugouts (or "bouli" in Burkina Faso) are artificial pools of about 3-4 m depth and 50-60 m diameter at the foot or midway up a slope where there is convergence of run-off (Barry et al., 2006). They are smaller than small dams, in terms of surface area, volume of water they impound and number of beneficiaries, and have no intake structures, canals and laterals (Namara et al., 2010). The removed soil is used to build an enclosure wall that is left open on the uphill side of the pool. The water collected can last for 2-3 months after the rains and is mainly used for livestock watering and to irrigate small market garden crops (Barry et al., 2006). Ponds are natural structures with the same functions as dugouts." (Douxchamps et al 2012, p11)

Small scale irrigation: "Irrigation implies the transport of the water from the reservoir to the crop, which is done either by hand from a nearby well, by means of gravity through tunnels, pipes or open channels fitted with control valves (Ofosu et al., 2010), or by mechanized irrigation systems involving pumps." (Douxchamps et al 2012, p11) Small-scale irrigation can be individual (e.g. family drip irrigation packs, South Africa, Senzanje et al 2012) or communal (e.g.

village schemes connected to a small reservoir, or sand-water abstraction,

Soil and water conservation (SWC) strategies: SWC strategies are *in-situ* interventions, at the micro-catchment scale, that aim to enhance water infiltration, improve soil water storage, and reducing soil erosion. They can achieve this by capturing and slowing surface runoff with physical barriers, or by improving the soil structure and fertility. Strategies include contour bunds (earth or stone), tied ridges, terracing, conservation tillage, mulching, composting, planting pits or *zai*, half-moons, live hedging and crop management (e.g. intercropping). (Douxchamps et al 2012; Barron et al 2009) SWC strategies are typically individual, but labour-intensive options such as terracing or stone bunds may be more easily implemented with community effort.

Strength of evidence: Low - Medium - High This reflects the quality of the data underlying the result - referring to the fact that a model's predictions are only as good as the data that goes into. For example, if the data is recent, consistently representative across the country, and is available at district level, for all factors in the model, the evidence base for the result is strong. However, if data is old or only available for a few points in the country, or only at national level, or only available for a few of the factors in the model, the evidence base for the result is weak.

Data definitions

General definitions used for each data variable present in the model. Country specific definitions can be found in the TAGMI Metadata files.

D_MARavg	Longterm average annual rainfall (mm) (1901-2005). (aggregation type: AVG) - minimum and average MAR per district
D_MARmin	Longterm average annual rainfall (mm) (1901-2005). (aggregation type: AVG) - minimum and average MAR per district
D_prox_riv	% of district area lying within 1 km of a perennial river
D_water_infr	Data unavailable
D_watertable	Data unavailable
D_gw_total	Data unavailable
D_gw_renew	Data unavailable
D_wpermit	Data unavailable
D_surfwater	Data unavailable
D_salinity	Data unavailable
D_numCBOs	The number of community-based organisations (CBOs), non-profit organisations and/or religious organisations present in the district, per 1000 population.
D_voting	Proportion of the voting population (%) who voted in the last government elections (Ghana: 2000; Burkina Faso: May 2007)
D_member	Proportion of households (%) whose head of household belongs to an association or organisation
D_interests	Data unavailable
D_disputes	Data unavailable
D_pastoralists	Presence of pastoralists, indicated by the average density of cattle in the district (head/ km2)
D_information	Percentage of women age 15-49 (%) who listen to the radio and/ or read newspaper and/ or watch TV on a weekly basis
D_remittances	Data unavailable
D_own_land	Data unavailable

D_avg_plot	Average area of land cultivated by each agricultural household
D_unemploy	Rate of unemployment (%)
D_eth_num	Data unavailable
D_femHH	The number of households in each district who acknowledge a single female as the head of the household, as a percentage of all households in each district.
D_g_credit	Ratio of women:men who borrowed money from a credit union
D_gratio	Ratio of women to men in the population
D_gemployment	Ratio of women to men who are employed
D_fem_assets	Data unavailable
D_poverty	Poverty Headcount Ratio at below '05 PPP $1.25/Day (percent) (2005)
D_avail_MFI	Density of micro-finance institutions available for individuals to access credit - number per 1000 households
D_acc_credit	Proportion of the agricultural population (%) who have access to agricultural credit or microfinance
D_wsafe	Proportion (%) of households with access to piped, point or improved (protected) sources of water; see country-specific definitions for details.
D_food_sec	Data unavailable
D_malnut	The proportion (%) of children under 5 years old who are underweight or severely malnourished.
D_clinics	Total number of clinics present in each district per 1000 households.
D_work_pop	Working age population - proportion (%) of total population aged between 15 and 64
D_g_ratio	Ratio of women to men in the population
D_HIV	Proportion (%) of the population sampled who were tested and are HIV positive.
D_migration	Data unavailable
D_income_gen	Data unavailable
D_literacy	Literacy rate - the proportion of population (%) aged 15+ who can read and write
D_ag_ext	Data unavailable
D_soil_mgmnt	Data unavailable
D_employment	The proportion of the working age population (%) who are employed
D_prox_rd	Proportion of district area (%) lying within 1 km of a road
D_equipment	Proportion of households (%) who possess agricultural equipment
D_postharv_infr	Data unavailable
D_transport	Proportion of households possessing a bicycle or other means of transportation (%)
D_market	Median travel time to human settlement of 20,000 or greater population. (aggregation type: AVG)
D_cell_net	Proportion of households (%) possessing a mobile telephone
D_input_market	Data unavailable
D_output_market	Data unavailable
D_SOC	Soil organic carbon (g/kg) in topsoil (0-5cm deep) - % area of district with high or very high soil organic carbon on the scale: 0-1 g/kg = low; 1-2 g/kg = medium; 2-5 g/kg = high; above 5 g/kg = very high
D_clay	% area of district with on average >30% clay in top 200cm of soil
D_sand	% area of district with on average 50-80% sand in top 200cm of soil
D_perc_lixi	Percentage of district area that has lixisol as soil type
D_cropland	Total cropland area (including irrigated) (ha) (2000). (aggregation type: SUM)
D_slope	Data unavailable

D_pop_dens	Average population density (people/km^2)
D_urbanisation	Data unavailable
D_bio_prod	Index of biomass production that is not crops, based on landcover types, with value range: 0 - 3 (100% city/cropland/bare - 100% forest)
D_cattle_dens	Average cattle density per district (head/ km^2), from Cattle density per grid cell (in 2005). (aggregation type: WGHTD)
D_firewood	Proportion (%) of households using firewood as the principal source of energy for cooking
D_dryspell	Data unavailable
D_outbreaks	Data unavailable
D_loss_prod	Data unavailable

References

Barron, J., S. Noel and M. Mikhail. 2009. Review of Agricultural Water Management Intervention Impacts at the Watershed Scale: a Synthesis Using the Sustainable Livelihoods Framework. Project Report Stockholm Environment Institute: Stockholm

Douxchamps, S., Ayantunde, A. and Barron, J., 2012. Evolution of Agricultural Water Management in Rainfed Crop-Livestock Systems of the Volta Basin. Colombo, Sri Lanka: CGIAR Challenge Program for Water and Food (CPWF). 74p. (CPWF R4D Working Paper Series 04).

Kemp-Benedict, E. S. Bharwani, E. de la Rosa, C. Krittasudthacheewa and N. Matin (2010) Assessing Water-related Poverty Using the Sustainable Livelihoods Framework. SEI Technical Report, 2010.

Senzanje, Aidan, E. Boelee and S. Rusere. 2008. Multiple use of water and water productivity of communal small dams in the Limpopo Basin, Zimbabwe. Irrigation and Drainage Systems 22(3-4): 225-237

Senzanje, Aidan, Timoth E Simalenga and Jabulani Jiyane. 2012 - unpublished. Definition and Categorization of Small-scale Water Infrastructure Technical Brief No. 1, CPWF L2