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## All systems go!

### 'Utilitisation'

Paper for the WASH systems symposium

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The long-standing weaknesses of rural water supply are examined from the perspective of limited effective demand related to concepts of the co-evolution of social (cultural), economic and institutional capital. The analysis suggests that, by donor and government's short-cutting of the demand responsive approach, we have failed to recognise that there is no shortcut to institutional co-evolution. If we want imported technology to function, in advance of effective demand, the only way forward is to recognise the need for ongoing external inputs to rural water institutions over and above any enabling environment.

It is suggested that the mechanism to achieve these necessary inputs is by promoting the 'utilitisation' of rural water. This means supporting existing supply agents to become customer and commercially-oriented organisations, professionalising community water providers and for urban utilities, at all scales, to begin absorbing rural areas into their service area. This as a means of institutionalising the long-term support that 'piped on premises' rural water supply requires. However imperfect, urban utilities have been co-evolving into something approaching a customer and commercially-oriented service provider. Not only are they closer in cultural terms to rural communities there is the added potential of eventually being able to cross-subsidise rural as well as low-income urban consumers from the urban revenue base. However, supporting services so far in advance of effective demand will require capital subsidies to continue.

## Introduction - the problem

This research-based literature and overview paper explores some of the complexities of service provider institutions within the overall context of the delivery of improved rural water supply. Although only partially a historical overview, it might be helpful, in the context of IRC's 50 year anniversary, to remind ourselves that 2019 is also the 50th anniversary of the first moon landing, achieving the US President's 1962 goal that 'we choose to go to the moon in this decade'. The Apollo program took a form of systems approach in order to solve a very specific challenge within seven years, albeit one full of unknown, as well as known, unknowns.

The well-remembered phrase from the later US Apollo program: "Houston, we have a problem" when the Apollo 13 mission suffered a severe malfunction, which they were

amazingly able to manage, can be contrasted with the 50 years of trying to improve rural water supply. We clearly still have a problem in rural water supply which no amount of duct tape or other quick fixes seems to have resolved.

It is likely that the successful decadal moon programme influenced the 1977 designation of the first Water Decade 1981-1990, followed by the 2003 designation of the second Decade for Action 2005-2015 to deliver the MDGs, followed by the 2016 designation of the SDG 'Decade (2018-2028) for Action'. If we are still having 'action decades' for such a simple technology as rural water we clearly have a problem.

One of the outcomes of the first water decade was the recognition that the sector should be following the demand responsive approach (DRA). This was to recognise that success in delivering improved access and sustainability had to reflect community/consumers' interests and that outsiders should only support what communities really wanted - with the inference that what communities really wanted would match what communities as consumers would be willing and able to pay, and then be able to maintain within the limits of their own resources, while recognising governments did not have the tax base to fund ongoing rural water operating costs.

High-income countries had themselves followed, unknowingly, a demand responsive approach, investing in improvements to rural water as economic growth and societal demands allowed. But it was slow. Improvements were implemented at considerably higher GDP per person than we are attempting in lower-income countries presently. Supply institutions evolving through the process of enhancing self-supply, then to community/municipal supply as standards improved, culminating in utility type, standalone service providers with an expectation of self-funding (albeit usually with subsidised capital expenditure financing).

This process continues - in some countries with centralised urban utilities absorbing all rural dwellings into their piped service area and in others with centralised management entities supporting decentralised service providers both requiring support for capital investment.

In a 2013 paper (Moriarty et al. 2013) we said, 'Behind headline successes in providing first-time access to water lie a number of pressing challenges to the dominant approach to rural water supply in developing countries, namely community management following a demand responsive approach. These challenges manifest themselves in poor performance of service providers, high rates of hardware failure and very low levels of service.'

Seeing what it has taken to deliver sustainable rural water supply in high-income countries it is not at all surprising that lower-income countries face difficulties, albeit with a lower service level to date. It is similarly not surprising that as a donor and access indicator driven sector, project promoters then cheated on the DRA. Because what the majority of rural consumers were prepared to actually pay for (irrespective of whatever the willingness to pay surveys might have told) cannot support an improved, equitable and sustainable water supply.

The DRA became 'are you willing to pay 5-10% of the cost of what we want you to have' and then allowed, in some countries, contractors to pay that 10% in order to get on with construction, and in other countries to accept that contribution in kind, e.g. through labour contributions with the donors and/or national governments picking up the real bill.

Consequently, the sector can report significantly improved access but is only achieving operational sustainability in countries which are moving upwards in middle-income status (Hutchings et al, 2015).

Even before the sector has begun to address, yet alone solve, the hand pump capital maintenance challenge, lower-income countries are being encouraged, and facilitated to some extent, to aim for improved, piped-on premises water supply. This is good news in terms of reported enhanced health benefits, along with the benefits of freeing up women's time and encouraging higher willingness to pay.

However, the management models to deliver these much-improved services have oscillated between self-supply, community management, NGO, private sector and various forms of government delivery with the limited results that the systems thinking approach is designed to address. This level of services is, usually, significantly ahead of effective demand - that is societal affordability and preparedness to pay for such service levels.

The with exceptions caveat needs to be addressed more fully as rural water has to be supplied across a broad spectrum of social, economic, geographical and hydro-geological conditions.

### **The systematic planning approach**

The spectrum of challenges, social, economic, hydro-geological as well as technical solutions encourages us to think more systematically about how each segment can be addressed, with a focus in this paper on institutional aspects. The initial drinking water decade coincided with the

Integrated Rural Development Planning (IRDP) era which was the first attempt by development banks and donors to bring together all aspects of the rural economy and to facilitate accelerated development. Perhaps influenced by the systems approach of the space programme, IRDPs tried to capture all elements and deliver a step change to rural development, including water supply. India's National Planning Commission evaluation (NIC, 1985) shows the challenges this approach faced. Among the many findings one stands out in the context of this paper: 'there were no follow-ups regarding maintenance of the assets delivered to the beneficiaries'.

The temptation for outsiders to deliver all-embracing top-down solutions has continued with the resurgence of integrated rural planning through the Millennium Villages project. One of the MVP evaluations (ITAD, 2018) suggest that the small gains being made in incomes through the USD 415 investment per person in integrated top-down development planning (though finding that there was limited integration in practice) was going towards meeting social needs (e.g. funerals) rather than any ongoing development and that 'there is no evidence that people living in the MVP areas have escaped the poverty trap'(ibid). Of relevance to the water and sanitation sector, they report 'increased access to and use of improved toilets, although there is qualitative evidence that this is unsustainable' (ibid).

In looking to be systematic in our approach Chen (1975) explains 'how are we to know we are not dealing with the whole problem and not just a part of it, since in many respects our perception is limited to what we can sense and perceive?'

### **Learning from five decades of feedback**

One of the key features of a systems approach is to respond to feedback. Focusing on institutional aspects, we could say that we have learnt that effective demand is even more fragile in heterogenous rural areas than urban areas, due primarily to lower incomes, the greater availability of alternative sources of water and the sense that households feel that the level of improvement on offer was not worth the cost. "We're not that bothered" could be one summary of consumers views, in that providing a service (requiring communities to take responsibility for giving a service), that was not significantly better (e.g. shorter walking distance) than what households (especially women) had been accessing for generations, was not a compelling offer. What do we mean by effective demand? Effective demand refers to what consumers are willing, able and prepared to

put cash down for. More formally 'the level of demand that represents a real intention to purchase by people with the means to pay' (OUP, 2010).

As we have long said in explaining the challenges of DRA, if you offer someone a Rolls Royce for free, who is going to turn you down? Even if a bicycle offers a similar level of transport from one place to another and is directly maintainable by the user. The first known reference to effective demand by the famous economist Adam Smith in 1776 refers to 'a very poor man may be said in some sense to have a demand for a coach and six [...] but his demand is not an effectual demand' (Wealth, Book 1,22, quoted in O'Rourke, 2007). A coach with six horses apparently being that generation's equivalent of a Rolls Royce.

By cheating we have delivered access but there are consequences. The Rolls Royce is soon parked up and useless for transport. Because there is neither the servicing capacity in that location for a such an expensive vehicle, let alone the ability to pay for equally expensive spare parts.

Does responsible government simply let the system lie idle? Does it put in a bit of money in the hope that it might help? Does it promote new management models in the vain hope they might somehow deliver the solution?

The author agrees that institutions, particularly management models, are part of the solution to unlock the rural water supply conundrum, but not necessarily as simply as we might hope. We suggested in 2013 the need for 'professionalisation of community management and/or provision of direct support to community service providers; adoption of a wider range of service delivery models than community management alone; and addressing the sustainable financing of all costs with a particular focus on financing capital maintenance (asset management) and direct support costs' (Moriarty et al, 2013). Ignoring the financing challenge for the moment, this paper addresses in more detail the reasons for the need for direct support and the means by which this can be provided. Experience and research suggest that it is possible to take a short cut in finance and funding but it is much harder to short cut institutional/governance capacity. Perhaps institutional failure is more closely linked to a lack of effective demand than we had realised? By contrast, where there is effective demand such as mobile phones, we find that institutions appear to work with no problem.

### **Co-evolution of effective demand and effective institutions**

There is an interesting body of literature, 'informed by evolutionary theory and complexity science' (Currie et al, 2016) regarding 'the processes by which institutions evolve, and how they can co-evolve with other institutions and culture'. Institutions, these authors define as 'human-

generated regulators of social interaction' with 'systems of inter-related rules which prescribe particular roles and regulate social relations' (ibid). This area of study has expanded to explain why some countries develop, and others appear not to, and the factors that have led to the spectacular development of some east Asian countries for example (Acemoglu and Robinson, 2012).

This paper focuses on evolutionary concepts that can be applied to understanding institutional change, in particular aspects of the co-evolution of society, economic development and institutional capital, noting the comment that 'the effectiveness of the institution is an emergent property at the institutional level' (Currie et al, 2016). Our task is to use some of these insights to consider why rural water supply fails. The author's shorthand version, of both Currie and Acemoglu, is that institution capital co-evolves with social and economic development in a virtuous circle, building upon each aspect over time.

The challenge we have introduced into the rural water sector is that by short-circuiting the co-evolutionary mechanism by delivering what we believe rural dwellers to be demanding (improved water supply), in advance of their co-evolution of actual demand and actual willingness to pay, that we have destroyed the possibility for genuine community institutional mechanisms to develop in time to support that short-cut service.

Short-cutting socio-economic-institutional co-evolution means we have to inject external support to the institutional aspect which in turn supports the social evolution in use. The co-evolution theory implies that whatever institutional solutions or management models we promote, they cannot be self-sustaining because they will not have had the chance to co-evolve to be in balance with the effective social demand. Rather we have imposed an additional, unaffordable demand.

If we accept this premise (recognising, of course, that no analysis and resulting model can ever be a best fit everywhere) we accept that the rural water institution must be supported long-term with external resources (human as well as financial) because we are asking that institution to deliver services above the trendline of social, economic and institutional evolved development. This confirms the necessity of the enabling environment, but more than that, it requires the acceptance for the need to have long-term institutional inputs - financial and professional - into rural water. There can be no institutional self-sustainability available because we have got ahead of ourselves.

## Possible solutions for institutions to sustain rural water supply

We must now consider the practical implications of this analysis. Rural water heterogeneity clearly requires a range of institutional solutions - there can be no one size fits all, particularly in the short term, and particularly if we really are committed to no one left behind.

There is a well-accepted range of possible management models, from self-supply and community management, through community management plus NGO and private sector, local government, to state/central government engineering departments with, in some countries, secondary town utilities. To function, every model requires some level of commercial capability (collecting and managing revenues as well as budgeting for expenditures), some local technical capability (plumbing and network management at its simplest) and, depending upon the water source, some level of professional input to water resources management, abstraction and potentially treatment. This might require only a couple of people (customer focused bookkeeper and plumber) part-time or, depending upon the scale of population to be served, a number of people along with the bulk water professional expertise.

However, very few of these skill sets, knowledge, attitudes and practices, will have had the opportunity to co-evolve with effective demand in a rural setting. Local people who have been trained and continue to be trained and supported require the ongoing external energy as described above. The more sophisticated the technical solutions, needed as populations grow and water resources are challenged by agricultural demands, the more sophisticated the service provider institution needs to be.

### 'Utilitisation' – customer and commercially-focused entities

To promote consideration of the challenge, this paper argues that if community management, local and federal governments and the private sector have not been able to meet rural water needs, every country has already co-evolved its own version of a public utility, at least in its capital and major cities. We are all aware of the manifold failings of many such urban utilities, tending to be reflective of (co-evolved with) governance capacity in the setting in which they have to operate. However imperfect, they are society's designated organisation to integrate the service and financial challenges of delivering improved water and sanitation to all in urban areas. We are also told (Heymans, 2016) of utilities now delivering significantly improved services to all their urban customers.

In rural areas, we are looking for solutions which are a step ahead of what rural has evolved on its own, recognising that to stay ahead there will need to be some form of external (to rural society) input of skills and energy over and above funding for capital investment. Ideally this means a step ahead that has already co-evolved as far as possible within that wider society. We should be trying to avoid management models imposed by donors or funding agencies. So is utilitisation of rural water supply part of the solution?

With apologies for such an ugly made-up word, used to promote the issue, 'The most helpful definition of a public utility is: 'a business organisation performing a public service and subject to special governmental regulation.' (Merriam Webster). It is suggested that rural communities need a water supply business, commercially oriented as well as customer oriented which can support its staff as well as the infrastructure it manages. Urban utilities have not been particularly good role models but they are the closest to the co-evolved institution that we can get. To achieve the utilitisation of rural water supply, we can envisage small town utilities, however imperfect some may be, given the mandate to expand their services into their surrounding rural areas, as with Embu and Murang'a, Kenya for example. With the new opportunity of mobile phone payment systems (for which demand has indeed been effective) we are able to address the revenue collection process efficiently. Kenya again being a prime example.

'SDG6.1 is never going to be delivered one handpump at a time. It is going to be delivered by industrialising the process of improving access to water. By systematising the process of making utilities bankable, and deploying this expertise across the world, we can deliver change at scale.'  
Gasson, C. to GIZ OECD Oct 2018 conference

In areas beyond the reach of secondary town utilities we should be planning to see effective community management plus micro-utilities emerging (Nenmeni, Kerala, for example, Hutchings et al, 2017) and as they continue to co-evolve, they might be expected to merge with adjoining entities to become more efficient and effective over time. One of the reasons for the Kerala micro-utility success is that part of the external energy required has come from returnees who have had the opportunity to co-evolve in other institutions (and countries) for a while and bring back that knowledge, attitudes

and practice to the benefit of their home community - in a community absorbable way. Enabling a multiplicity of micro and mini utilities will, as they co-evolve, throw up better ways of doing things, better forms of management and leadership. To which the other providers will either respond or, potentially, be absorbed into a larger community utility.

These micro and mini customer and commercially focused utilities cannot be fully self-funding. The capital intensity of piped on premises, both capital expenditure (CapEx) and capital maintenance expenditure (CapManEx), are beyond the carrying capacity of even evolving effective demand in rural areas, particularly in the context of the heterogeneity described above. It is a different challenge from that involved in serving a single large city. Is this suggesting that local government departments cannot function as rural supply utilities? We find that the majority are simply not established to perform as customer and commercially focused entities and find it difficult to ringfence their service departments sufficiently, both with regard to revenue and to external financing.

Is there a role for NGOs? The challenge for any demand-based approach is that it cannot deliver no one left behind. For remoter, socially weaker, economically disadvantaged rural communities water supply has to be a government funded service, most efficiently delivered by not-for-profits or NGOs. Utilitisation is not yet the answer there. For the slightly better off communities, is there a role for the private sector? It may often be cheaper for micro-utilities to hire in plumbers as needed rather than hiring them full time. It can be more effective to have private management contractors running small town systems (Brammah etc), but private finance for CapEx is almost always too expensive in such settings.

Depending upon hydrogeological conditions and agricultural demand, there will be a need for access to enhanced bulk water resources. This is to be delivered by a government mandated/developed/funded bulk water supplier wholesaling treated water to community level micro retail utilities. The required external inputs increase by an order of magnitude as the need develops for treated bulk water supply, usually from surface water, requiring ever more professional expertise and capital investment

The expansion of urban utilities into rural areas provides a future opportunity for cross-subsidies from urban to rural, potentially reducing the government's taxation based rural subsidy and transferring the cost to urban consumers. Recognising the limitations in tariffs as well as performance of too many conventional urban utilities,

governments might be able to help themselves by allowing urban tariffs to rise (as services improve, another necessary co-evolution) so the city utility can take on the responsibility of providing the external energy necessary for rural sustainability. If that sounds too futuristic, National Water and Sewerage Corporation, Uganda shows that it can work.

### The Uganda example

Increasingly, there are national utilities who manage themselves above the co-evolutionary trend line in a dramatic way, due to consistent leadership, commitment and vision (Muhairwe, 2009). They have found their own evolved ways of freeing their utility from the all too common isomorphic mimicry (Pritchett et al, 2010). Then based on the strong foundations of predecessors (Hilary Onok and Dr William Muhairwe), the next generation of leaders (Dr Silver Mugisha and colleagues) have expanded their 24 urban centres coverage to include a further 200 smaller urban centres. From that base they are now delivering 8,000 km of water mains to connect water to 12,000 villages by 2020 within NWSC operational areas giving piped water for the first time to an additional 7.7 million people through 20,000 public standposts and 140,000 new connections (Amayo, 2018). They report 'the total financing commitment for the period 2017-18 is UGX 213 billion [USD 57.2m] of which 58% is by NWSC and 42% from the Government of Uganda.' Suggesting a piped water cost of USD 7.43 per person served.

The government is supporting this through significant funding for CapEx, NWSC is also contributing through internally generated funds (urban-rural cross-subsidies) and have the professional skills, attitudes and management incentives to deliver. Utilitisation indeed!

### The India example

The Government of India has a plan to deliver piped on premise supplies to all rural inhabitants by 2021. The policy is that, 'The cost of water supply provision beyond the basic minimum need must be borne by the consumers. The goal should be to move up the water ladder of service delivery so that ultimately all rural households are provided with adequate piped safe drinking water supply within the household premises' (Rajiv Gandhi National Drinking Water Mission, 2010).

Researching across 17 States, researchers found that for the most successful community management schemes, government paid 90% of CapEx and 50% of OpEx (often through the little noticed subsidised power tariff for public water supplies), and 100% of urgent Capital Maintenance Expenditure in successful community managed rural

water supply schemes (Franceys, 2016). In the remainder of the 600,000 villages it is only possible to assume that government is paying close to 100%. Rural water supply, particularly rural water to all, is costly and unable to be self-funding, let alone self-financing at this stage of development. The empowerment of some communities to become non-profit making micro-utilities (through the provisions of the Societies Act, Kerala for example) and others to become active community retailers of State Government provided bulk water (Tamil Nadu and Gujarat examples) is an impressive demonstration of rural utilitisation (Hutchings et al, 2017).

### A high-income country footnote

In low-population density rural France (GDP per person USD 38,500) the government is investing EUR 6.5 billion over the next five years in grants (EUR 4.5bn) and low-cost (concessional) loans (EUR 2bn) to upgrade/update water supply and sanitation systems with rural areas will be a priority target (GWI, 2018). This indicates government subsidies of USD 108 per rural person per year (on the assumption that all funding goes to rural communities). It is also instructive to hear that a 2015 law requires consolidation of rural utilities: 'From over 18,000 today, the number of local authorities managing water and wastewater services is expected to shrink to between 1,500 and 3,500 when the law takes full effect in 2020'(ibid). One commentator explaining, 'larger consolidated utilities have a greater capacity for investment than single municipalities, thanks to economies of scale'(ibid). This suggests rural utilitisation is an ongoing process.

And if that seems to be a surprisingly high amount for a high-income country purportedly recognising the water pays for water approach, in the USA (GDP per person USD 59,500), federal grants and loan subsidies for water utilities infrastructure CapEx are reported to have averaged USD 6.9bn per year, 1969-2014 (2014 prices) with recent grants for OpEx of USD 1.4bn per year (1999-2014). Which approximately converts to USD 115 CapEx subsidies per rural person per year and USD 23 per rural person per year in OpEx support. Even larger funding is reported from state and local government spending (offsetting collections included as negative expenditures) which reportedly has averaged USD 32.5bn per year CapEx (2014 prices) since 1969, and USD 66.8bn per year OpEx (author's analysis of CBO, 2015). This converts to USD 542 per rural person per year for CapEx funding, and USD 1,113 per rural person per year in OpEx funding. These figures are so high that there must be considerable government funding also of semi-urban supply.

'By and large, the onus of public funding water and wastewater capital projects has been on state and local governments for the past couple of decades. In 2014, even after five years of decline, state and local governments still accounted for more than 90% of all public spending on capital projects' (Eskaf, 2015). Rural water financing is an ongoing challenge, irrespective of institutional needs.

### Conclusion

The demand responsive approach, one of the outcomes of the first drinking water decade, recognised that to achieve the principle of rural communities being 'involved in all aspects of water/sanitation, from planning constructions and financing, to training, operation and maintenance' (UNDP, 1980, in O'Rourke, 1992) communities had to be in control of deciding what level of service they wanted and were prepared to pay for. The assumption being that this would lead to sustainability with communities replacing 'highly centralised, fragmented and inefficient [government] institutions in the water sector' (ibid)' The DRA ideal was quickly abandoned by both governments and donors in the honourable pursuit of increased access coverage, with only a token 5%-10% community contribution remaining as a signal of demand. With the well-recognised results on limited sustainability. The co-evolution of institutions literature suggests that institutions evolve over time with a symbiotic relationship between socio/cultural development, economic development and institutional development. In by-passing socio-economic effective demand we have removed the possibility for the co-evolution of an effective institution. As the world supports lower-income communities to move towards improved piped on premises supplies, effective institutional support becomes even more critical.

With reference to case studies, this paper has argued that by removing the mechanism of institutional co-evolution in rural areas, water supply institutions now have to be directly supported by external agents if they are to deliver water in such heterogeneous and limited economic circumstances. The solution proposed - utilitisation - to challenge and convey the necessary process of rural water supply being supported by a public utility (micro, mini or conventional), where the necessary customer and commercially-oriented staffing needs are supported by the closest urban utilities and/or by professionalised bulk water capabilities in the form of a public utility. While recognising the weakness of many existing urban public utilities, it is suggested they have co-evolved sufficiently within their social and economic context to be the best we can get.



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