Quality is a "wicked problem" that requires hybrid solutions

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ABSTRACT: (9 pt)
Rural India is at the global forefront of the fight to improve drinking water quality for low-income groups. Within the context of global consultation regarding the appropriateness of water quality targets in the next generation development goals, it provides an opportune focus for this review of service delivery models for water treatment. Whilst acknowledging the rightfully dominant role of the state in this space, the analysis seeks to present the breadth of delivery models in order to ask what we can learn from each model. In turn, self-initiated, opportunity-driven and externally-supported approaches are reviewed demonstrating a wealth of models that make use of varying mixes of government, community and private resources to deliver treated water to rural peoples. Each approach provides learning but it is argued that tackling water quality is a *wicked problem* with no universally right policy prescription. Instead, contextual solutions are needed which should be driven from below by local institutions. Developing the concept of *institutional bricolage* it is argued that this policy-from-below is the only realistic approach as it avoids the trap of prescriptive guidelines that lead to superficial change in communities rather than genuine water treatment adoption. The implication for policy makers is to welcome hybridity within the service delivery landscape as this promotes choice and flexibility at the local level. At the same time, however, the state must not abdicate responsibility and should continue to invest in the sector as well as provide strategic leadership.

INTRODUCTION

In 1972 the Government of India (GoI) launched the Accelerated Rural Water Supply Programme (ARWSP) that heralded a period of substantial public investment in the rural water sector (GoI, 2010). Under the rebranded Rajiv Gandhi National Drinking Water Mission and affiliated programmes, official statistics showed that access to 'improved water' reached 94 per cent in 2008 (GoI, 2008; Ratna Reddy et al., 2010). Indeed, from a global perspective, India has received high praise: when announcing the fulfillment of the drinking water Millennium Development Goal (MDG) the country received special reference for the 522 million people who gained access between 1990 and 2010 – accounting for one quarter of the global total (UN, 2012). However, closer inspection of these numbers has since revealed some worrying, underlying trends. This includes concerns over the narrow definition of global targets which pay no attention to issues of quality, quantity and access, all of which are fundamental to human health (Clasen, 2012). Indeed, in one study Parker et al. (2010) estimate that only around 35% of improved sources meet World Health Organisation standards for coliform bacteria, whilst the UN itself reports that: "Water quality surveys showed that many improved drinking water sources such as piped supplies, boreholes and protected wells do not conform to WHO [World Health Organisation] guidelines. On average, half of all protected dug wells may be contaminated, along with a third of protected springs and boreholes" (UN, 2011). In India, there is growing evidence that quality problems persist in supplies from so-called as 'improved sources', with safe coverage dropping below 50% when taking into account stringent water quality parameters (Properzi, 2010; Godfrey et al., 2011).

Against this backdrop, extensive discussions are taking place regarding the value and practicalities of tracking water quality in the next generation global water and sanitation targets (UN System, 2012; UNCSD, 2012). With the largest population of low-income people in the world (World Bank, 2013), India is at the vanguard of both the policy and practice of delivering improved drinking water quality to people living in or close to poverty. It therefore provides an opportune focus for a review of the major service delivery models for water treatment in low income contexts. As such, this paper sets out to assess the state-of-the-art in terms of institutional approaches to water treatment and then to provide comment on the policy implications of this analysis. The review reveals how technical questions soon become intertwined with societal values and questions of social justice: there are no universal solutions. Tackling water quality in low income areas is conceptualised as a "wicked problem" that is characterised in different ways by interdependent actors who offer contrasting analyses and solutions (Rittel and Webber, 1973). However, underlying these differences are some fundamental principles. The nature of the rural context means that the costs and management challenges of many schemes are prohibitive, and thus local community members in low income areas must take some responsibility for water quality management. Developing the concept of hybridity, the paper seeks to comment on the challenges of developing policy in this domain. It argues for a move towards an institutional landscape which promotes diversity in service delivery models whilst maintaining strong government-centred control over key functions, such as data management and resource allocation. The paper concludes that policy makers must find the fine balance between centralised control in terms of measuring water quality risk and decentralised flexibility in terms of responses to water quality problems both in rural India and other similar contexts around the world.

RURAL DRINKING WATER SERVICES IN INDIA – A BRIEF REVIEW OF THE POLICY CONTEXT

Water quality is a contextual issue which manifests in different ways over time and place. The problems that may arise from a groundwater source in Bihar pose different challenges to a rain water harvesting system in Kerala. Article 47 in the Constitution of India places responsibility on the State to provide clean drinking water and a succession of ambitious legal and policy programmes, including the Water Pollution Act and Pollution Control Boards, have tried to address quality issues (Wate, 2012). However, around 220,000 children continue to die annually from diarrheal diseases (UNICEF and WHO, 2012) and approximately 80 million Indians are reliant on contaminated groundwater sources (Wate, 2012). Rural populations suffer particularly high risks as the operating conditions that characterise many rural areas – poor, remote and scattered – mean that water treatment is often too expensive and complex for the available financial and managerial resources (Schouten and Moriarty, 2003; Lockwood and Smit, 2011). For this reason, water treatment only represents a last resort in most rural communities that is used if no other safe source of water can be used within the locale. It is also importance to note that isolated use of water treatment does not guarantee safe water consumption, and that other factors such as working to improve agricultural practice and hygiene and sanitation behaviors can also lead to significant improvements in water quality and public health (Schouten and Moriarty, 2003). Nonetheless, in some at-risk communities – particularly in areas that suffer complex anthropogenic and geogenic chemical contamination – treatment of drinking water is a necessity for ensuring the health and wellbeing of the population. It is such cases that present some of the most difficult challenges and on which this review focuses.

Framing the subsequent discussion then the overall operating conditions of the rural water sector must be considered. With each state taking the lead in terms of its approach to delivering rural services, there are vast differences between the use and success of different models. Certain programmes receive high praise, such as the state-wide initiative of WASMO in Gujarat (James, 2011), whilst other states facing complex quality problems and high rates of poverty have less success and invite ridicule. Taking the sector as a whole, research has shown that more than 30 per cent of rural water infrastructure is in a state of disrepair and much of this consists of basic infrastructure such as wells and hand pumps (Reddy and Batchelor, 2012). This worrying statistic demonstrates that a lack of sustainability – whether this is financial, managerial, environmental or some other factor – is undermining much work in the rural domain, even for relatively straightforward infrastructure. Some have argued such failure is a result of an overly centralised approach that places too much emphasis on infrastructure at the expense of the institutional development needed to ensure the management of services over the longer term (James, 2011). Yet decentralised approaches face their own challenges as they often result in fragmented schemes that become too resource intensive at scale (Lockwood and Smit, 2011). The Government of India has recognised this and put in place admirable initiatives to

encourage innovation in this domain whilst not abdicating responsibility and maintaining public investment.

In 2010, the Department for Drinking Water and Sanitation (DDWS) established a Working Group in partnership with the UN Solution Exchange e-platform to solicit suggestions for "how best to improve the sustainability of service delivery" (James, 2011). In 2012, the Draft National Water Policy 2012 laid the foundations for legislative changes that will promote a limited liberalisation of the sector providing a space for hybrid service delivery models to develop that can help improve sustainability across the sector (GoI, 2012). This space for hybridity is particularly welcome for considering institutional models in complex cases, which include costly water treatment solutions. As will be shown, the Government of India already has well-establish and funded programmes for monitoring and responding to water quality risks however there remains significant sections of the populations that continue to consume unsafe water. Using liberalisation to develop a policy landscape that welcomes hybridity in terms of service delivery can enable schemes to build-on and further develop the functioning government programmes rather than challenge or circumvent them. This would help overcome the limitations of centralised approaches, whilst avoiding the fragmented and resource intensive nature of some decentralised models.

TYPOLOGIES OF WATER TREATMENT APPROACHES

In a recent review of the water technology landscape, Loo at al. (2012) contrasted 39 decentralised water treatment technologies for humanitarian contexts. Clearly, effective water treatment exists for a multitude of contexts but the difficulties occur in the *application* of this kind of technology within the messy, reality of the social world. In its applied setting, the technology must be located within a social system of management that will provide an appropriate operating environment to ensure its continued use over the long term. There are a multitude of contextual models that can be loosely bounded together into a typology of delivery approaches. For the purpose of defining these typologies Visscher and Da Silva's (2006) adapted model below will be used. It is organised by the underlying motivational driver of each approach making it a useful tool for distinguishing the discrete differences that are emerging in this quietly liberalising sector:

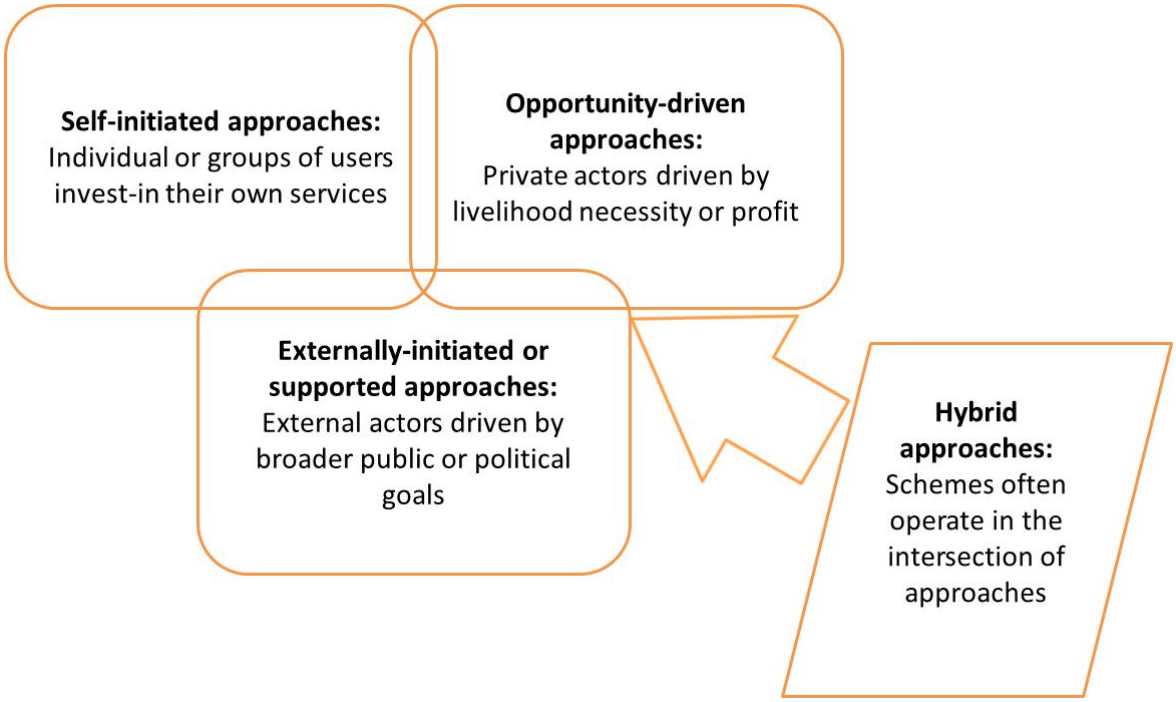

Figure 1 "Overview of delivery approaches and their drivers"*

*Adapted from: (Visscher and Da Silva Wells, 2006, p.8)

As with any model in this context it defies the reality of complexity and the typologies are not mutually exclusive. It also suggests that many schemes now operate in the hybrid zone between different

approaches and it is these hybrid models which are thought to hold the greatest promise in terms of delivering water treatment. In turn, the paper asks what can be learnt from each approach.

WHAT ARE THE LESSONS FROM SELF-INITIATED APPROACHES?

Either at the individual, household or community level, rural people often take responsibility for the management of their own water resources. For any approach, community members represent the front-line in terms of service delivery as both service consumers and potential providers. Historically, India has a proud and vibrant history of self-initiated water management practices. With examples in Rajasthan and Bihar of management techniques that are hundreds, if not, thousands of years old and which continue to be used today. These holistic management systems, however, tend to be systematic approaches to managing quality based on the principles of source preservation and protection, through innovative techniques such as rainwater harvesting to ensure groundwater recharge. Less common are stand-alone treatment techniques, although there are examples of various point-of-use treatments using natural substances. These include the use of Kataka seeds or Drumstick seeds as coagulants, as well as the ubiquitous boiling of water at the household level (Khurana and Sen, 2008). Boiling is widely known as an effective approach for reducing biological risks, yet its effectiveness for dealing with complex chemical contamination is limited (Clasen et al., 2008). From a financial point of view, it is also surprisingly expensive and it has other externalities in terms of deforestation and the quality of the surrounding environment (Clasen et al., 2008). These last factors make it a less than ideal solution.

With large swathes of East India still suffering the unintended consequences of the push to groundwater in the 20th Century, many communities are left consuming water from deep boreholes that suffer dangerous levels of arsenic and fluoride. Whilst such problems are not exclusively limited to these geographical areas, an interesting revival in open-well use has been occurring in parts of Bihar state. Such an approach combines basic chlorinated water treatment of surface water with the traditional knowledge of open well management as practiced in Bihar for centuries. Hybridity of traditional and modern approaches is often the reality of self-initiative approaches, rural people do not live in isolation and learn to adapt to a changing world (Mascarenhas, 2012). It is thought that external agents working on rural water issues from a policy and practical perspective have much to learn from the hybridity of traditional knowledge. This, it seems, is not always appreciated and there are examples of clashing interpretations of water management problems whereby state engineers refuse to appreciate local knowledge of groundwater despite wider evidence suggesting that local farmers have very reliable knowledge on this matter (Birkenholtz, 2008). Recognising the plurality of knowledge that exists in this domain is part of responding to a “wicked problem” like water governance (Rittel and Webber, 1973; Franks and Cleaver, 2009). A broad body of theoretical work has demonstrated how two groups of experts operating under different epistemic rules come to define problems in distinct but legitimate ways (Evers et al., 2009). This heterogeneity of knowledge is pervasive when it comes to the ‘knowledge-of-water’ and impacts on the ability to develop policy that meets the needs of all stakeholders.

Developing policy that can take account of local knowledge is part of the process of recognising that local community members remain the most important agents in any service delivery approach. They are not only service consumers whose needs must be meet but they also represent potential service providers and bearers of legitimate water-related knowledge. When tackling water quality problems, self-initiated approaches may be somewhat limited in the cases of difficult water quality risks, however, they provide lessons on the value of local perspectives and the agency that rural people hold. Certain enlightened methodologies are already trying to maximise the beneficial use of this agency for the purposes of water management, through initiatives such as participatory groundwater management which so far has centered on shared learning between farmers and groundwater scientists (Chambers, 2008; India Water Portal, 2010). This improves the availability and quality of groundwater data and also helps democratise the entire process of database management. Developing similar models for participatory water quality measurement may provide one opportunity to maximise the learning opportunities from self-initiated supplies to the wider sector. Developing such a process would require centralised oversight from policy makers at high levels but the role of the community as potential sources of water quality knowledge should not be underestimated.

WHAT ARE THE LESSONS FROM OPPORTUNITY-DRIVEN APPROACHES?

The application of market-based principles to the provision of water to the rural poor is fraught with controversy. It challenges a deep subsidy culture that exists between the rural poor and the Government of India (O'Reilly and Dhanju, 2012) as well as numerous cultural beliefs regarding water as a universally-free resource (Schouten and Moriarty, 2003). Indeed, profiteering in this space would be extremely unethical and morally repugnant. However, in the hybrid spaces of opportunity driven approaches, there appears to be promising cases that whilst not providing a universal model may offer some learning and expand the catalog of possibilities. Point-of-use treatment products are abundant in India, with chlorine-based sachets offering a low-cost, highly mobile treatment product, and household water filters offering a slightly-higher cost, slightly-less mobile – but, perhaps, more-useable – product. For distinct reasons both remain a minority product for the rural poor. The chlorine powders offer extremely effective solutions especially during high risk times – such as a known outbreak of cholera – however, use is irregular (Luoto et al., 2012). A multitude of factors of interrelated factors may be at play, including cost, usability and taste, but for whatever reasons widespread use has not materialised (Freeman et al., 2012). Household water filters, such as the Tata Swatch, also remain largely an aspiration product for the rural poor. An evaluation of a household filter dissemination campaign in Andhra Pradesh showed a purchase rate across the targeted communities of 10% leaving over 90% without filtered water (Freeman et al., 2012). Still more worrying, when returning for a follow-up study, the authors discovered the majority of users were not using their filter in the correct manner which compromised its effectiveness. Clearly, such products are not a replacement for properly treated water services, they can, however, fill a certain space in the market until universal safe supply is achieved.

Across the world when public infrastructure either due to inadequacies or absence fails to provide safe potable water, water kiosks – both formal and informal – often appear to fill the space (Opryszko et al., 2009). This is especially true in in urban low income regions where a captive market are keen to access the services of water kiosk operators. Rurally, especially in India, kiosks are rarer. However, they do offer a particularly relevant model for areas with complex problems where people are willing and able to contribute to the cost of treatment technology. In Andhra Pradesh, the Safe Water Network is one operator working on such model which combines philanthropic investment with a sustainable user tariff (Safe Water Network, 2013). In this model, a centralised treatment center is established within a community that retails high quality potable water to the community. However, with these models, equitable supply is a genuine problem and questions remain over the legitimacy of kiosks that often source water using public assets before adding-value by treating the water. Cross-subsided models may help respond to the equitable access question, but in a similar vein to the opportunity-driven POU treatments, private kiosks are thought to fill a vacuum in places where public services have not yet reached rather than offer a scalable solution. They do, however, provide an interesting model for distribution that minimises capital outlay making them appropriate for remote communities. In this regard, publically funded or subsidised kiosks may have some potential in certain communities.

Under the guise of opportunity-driven approaches there are examples of communities that become active consumers within an open market for service provision. In these cases, empowered communities take the initiative to procure their own services to supplement government schemes. Although potentially controversial such active citizenry is thought to be a welcome development even if it is an unintended consequence of another scheme. Reviewing the “Pani hi jivan hai!” – Water is Life – initiative in Rajasthan, O’Reilly and Dhanju (2012) argue that hybrid state-supported marketisation scheme only served to usher in a privatisation of services over the long term. In a rather critical evaluation, they suggest that tariffs were set too low resulting in inadequate cost recover which in turn prevented the required investment in services leaving communities with unreliable connections. This led to the community – empowered through the newly form water committee – investing and organising its own services to supplement the government scheme. Whilst not the intention of the programme, the active engagement of the community in the procurement of further water services would appear a positive result. However, the authors of the original article conclude that they remain skeptical about the ability of commercialised approaches to meet the poorest in Rajasthan society (O'Reilly and Dhanju, 2012). For policy makers such developments should be welcomed within the institutional landscape whilst at the same time not mistaking active citizenry as a sign that public services are not required for communities that take this choice. They remain citizens whom the government has a constitutional responsibility to serve.

WHAT ARE THE LESSONS FROM EXTERNALLY-SUPPORTED APPROACHES?

The Government of India is the ultimate bearer of responsibility for clean drinking water and must remain both the dominant provider and exclusive setter of policy in this domain. As will be argued, however, some of the most effective examples of government supported schemes involve hybrid service delivery approaches that make use of community resources and limited-use of private operators. Across India there are well-established institutional structures for responding to water quality risks built around the Public Health Engineering Departments (PHEDs) and Rural Drinking Water Departments (RDWD), both of which must operate in conjunction with a variety of other bodies to test, treat and manage domestic supplies (James, 2011). They oversee the testing of water using field-tests and where needed more detailed analysis in district level laboratories. Attempts are ongoing to produce dynamic data bases that incorporate multiple water-related metrics, including quality based measures that take into account chemical and biological data, but also wider social and public health measures (Sharma et al., 2013). Whilst these large bureaucracies are well placed to coordinate such water quality databases and should therefore take an active role, it is operationalising effective responses to identified risks that is the major challenge going forward. Like most public institutions in India, the PHEDs and RDWDs have substantial funding and resources but they must serve very large populations across vast geographical areas. This inevitably means resources can be spread thinly leading to some cases where inadequate services are provided. There are a number of interesting initiatives, however, where PHEDs and RDWDs seek to maximise the input of the community whilst providing adequate financial, managerial and technical support. Such schemes include the WASMO programme of Gujarat, the Jalswarajya programme of Maharashtra, and the Jalanidhi programme of Kerala (James, 2011; Lockwood and Smit, 2011). All of these have their origins in the 2002 Swajadhara programme that advocated a move from a supply-driven to demand-driven model built around the establishment of village water and sanitation committees and cost sharing between government and communities. This initiative marked a significant point in the broadening of service delivery models in India, opening up increasing opportunity for hybridity.

In the Jalswarajya programme in Maharashtra the Government of India with support from the World Bank funded services in 3007 Gram Panachayats between 2003 and 2011. A service delivery model was advocated based on the principles of professional community management that promotes a scientific approach to community water, sanitation and hygiene services (James, 2011; Lockwood and Smit, 2011). The model harmonises approaches across institutional scales, with service delivery taking place in the villages but with support organisations providing services to groups of 10 Gram Panachayats and the state government taking a strategic management and resourcing role (Mujawar et al., 2011). Water treatment technology was only considered a last resort after state-employed groundwater experts assessed the available resources to be of poor quality. However basic disinfection was supplied in most cases. The cost would be included in the operational and maintenance outlays of any system and community tariffs covering 100% of these costs would be negotiated with the community before implementation. The initial capital expenditure would be covered by the public institutions with 10% coming from the community via cash or labour. This is thought to provide such a vibrant model as the state and the community come together to make an assessment of community need and available resources. From this assessment then a delivery plan can be developed in partnership between the state and the community. In cases where expensive water treatment is needed the state can allocate additional resources, however in cases where the community can cover costs and provide adequate non-technical support services, then the state can step back – save money – and only intervene when required. This inherent hybridity increases flexibility improving service delivery.

Operating broadly in this space are also a number of philanthropic or charitable schemes where domestic or international donors invest in community based water supply motivated by the public good. In isolation these can represent excellent initiatives that provide the opportunity for developing innovations, both technical and managerial. In West Bengal, for example, two water research institutions came together to develop and test a low-cost ionised arsenic treatment unit (Sarkar et al., 2010). Whilst this seemingly excellent initiative operated broadly through a professional community management model and was deemed successful in the communities in which it operates, it will fail to reach scale across the arsenic affected regions of India without the support and investment of government. These philanthropic initiatives should be welcomed into the hybrid operating environment particularly as sites for innovation and learning, but they will never replace the role of the government. The underlying lesson for policy makers is that government can do more in partnership with other

institutions and models. Government should not abdicate responsibility for delivering water services but by looking beyond its traditional models it can benefit from a richer mix of thinking, capability and resources.

HYBRIDITY UNWRAPPED: NAVIGATING COMPLEXITY AND DEVELOPING POLICY

A policy maker cannot plan service delivery approaches that will be successful in every circumstance. They, however, have a responsibility to provide an overarching institutional context in which successful service delivery models can be developed. When considering policy initiatives to promote the use of water treatment by at-risk rural populations, then the challenge is made more difficult because of the heightened cost and management burden that treatment places on water service systems. The policy maker faces this problem which is concurrently contextual – solutions must be tailored to each community – but which is also defined by overriding structures of necessity – all services must reach financial and managerial viability. The interface between context and structure characterises this "wicked problem" which is beyond the limits of a purely rational science (Rittel and Webber, 1973). In an attempt to navigate such a predicament an emerging body of critical institutional theory is thought to hold some relevance which makes a distinction between the approach of policy makers in public institutions and social scientists studying policy in academic institutions (Cleaver, 2012). In short, the work argues policymakers emphasise simplicity and universal principles, whereas social scientists produce unhelpful complex knowledge. Setting the challenge for each group Cleaver (2012) urges the emergence of a third way in which complexity is allowed to enter the policy-making arena and social scientists accept the pragmatic need to produce analysis which is legible to wider audiences. Making the case for hybridity in service delivery models is thought to be one way of encapsulating this match of complex realities with the simplicity needs of policy makers and practitioners. Grounding the argument for hybridity, a case will be made for policy that supports bottom-up service delivery that is directed and legitimised at the local level.

The examples outlined above demonstrate that extra-local institutions – such as Public Health Engineering Departments – are pivotal in delivering water treatment. However, it is clear that extra-local institutions are unable to provide sufficient resources alone and they work in partnership with local institutions including the Gram Panachayats or village-level committees in order to delivery services in rural communities. Moreover, there are many cases where local institutions are able to arrange their own water treatment via alternative arrangements, such as chlorinating open wells or establishing small-scale water enterprises, with minimal support from extra-local institutions. Consequently, this work considers local institutions as central to all schemes and thus the most important institutions within the policy making landscape. The problem for policy makers is that they are numerous, contextual and often operate outside of the rest of the professional sector. This demands new ways for creatively and effectively engaging them in the process of water treatment service delivery. Policy makers need to consider institutional models that provide resources to and promote accountability in local institutions, whilst also recognising that overly prescriptive polices will lead to a lack of flexibility dampening the potential for locally-driven service delivery.

In this space more nuanced understandings of local institutional development, based on social theoretical analysis, may provide an opportunity for reconciling the need for bottom-up contextual models and the reality of top-down flows of resources and accountability. Cleaver's (2012) "Institutional Bricolage" is one such model of institutional formation which describes:

"A process in which people consciously and non-consciously draw on existing social formulae (styles of thinking, models of cause and effect, social norms and sanctioned social roles and relationships) to patch or piece together institutions in response to changing situations."

(Cleaver, 2012, p.45)

This body of work rejects a design principle whereby policy makers in faraway centers can realistically design the workings of local institutions. Instead, in its most basic form, it suggests that local institutions are influenced by locally embedded socio-political arrangements which differ from place to place. Such thinking has implications for understanding how water treatment can best be embedded into any given community. The arrangements for this process of institutional embedding will be largely driven from below regardless of the design of any policy initiative. Recognising that development-by-design is an extremely limited concept is crucial as top-down initiatives often lead to "isomorphic

mimicry" in which local institutions change in appearance to match prescriptive guidelines but their underlying functioning remains the same (Pritchett et al., 2010; Andrews et al., 2012). This has major implications as it leads to "capability traps" whereby changes in the appearance of local institutional arrangement merely mask a deficiency in the working of local institutions and thus prevent genuine reform (Andrews et al., 2012). Developing policies that welcome and promote hybridity in service delivery is thought to help negate the potential for isomorphic mimicry by enabling a diverse set of delivery models to develop as directed by local institutions. Such flexibility does not mean the abdication of responsibility by the state. The government must remain the ultimate bearer of responsibility but in supporting diverse models at the local level it encourages a more diverse and robust structure whereby delivery models are driven from below and public, private and community institutions work together to serve the population.

CONCLUSIONS

Rural India is at the global forefront of the fight to improve drinking water quality for low-income groups. Within the context of global consultation regarding the appropriateness of water quality targets in the next generation development goals, it provided an opportune focus for this review of service delivery models for water treatment. Whilst acknowledging the rightfully dominant role of the state in this space, the analysis sought to present the breadth of delivery models in order to ask what we can learn from each model. In turn, self-initiated, opportunity-driven and externally-supported approaches were reviewed demonstrating a wealth of delivery models that make use of varying mixes of government, community and private provision to deliver treated water to rural peoples. Each approach provided learning but it was argued that tackling water quality is a "wicked problem" with no universally right policies (Rittel and Webber, 1973). Instead, contextual solutions are needed which should be driven from below by local institutions. Developing the concept of *institutional bricolage (Cleaver, 2012)* it was argued that this policy-from-below is the only realistic approach as it avoids the trap of prescriptive guidelines that lead to superficial change in communities rather than genuine water treatment adoption. The implication for policy makers is to welcome hybridity within the service delivery landscape as this promotes choice and flexibility at the local level. At the same time, however, the state must not abdicate responsibility and should continue to invest in the sector as well as provide strategic leadership.

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