Integrated method in international development for water solutions using the rights-based approach

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ABSTRACT

The introduction of the rights-based approach to International Development has presented a new set of challenges to those working for the water and sanitation sectors in developing countries. This introduction of this additional pressure on both State and Non-State Actors working in the field has necessitated an overhaul of the existing needs based responses. The engineering solutions and intermediate technology currently available often fail to address the complex requirements of the recipients. This study addresses the change that is required and suggests an integrated engineering approach that will be capable of responding accurately to the requirements of the beneficiary. It proposes an ‘integrated method’, a way of combining technology, community participation and education.

Key words | community participation, education, integrated method, international development, rights-based approach, technology

INTRODUCTION

“The human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realisation of other human rights … Water should be treated as a social and cultural good, and not primarily as an economic good … Water, and water facilities and services, must be affordable for all” (General Comment 15: ICESCR 2002).

The right to water is not dependant on political or economical status of an individual. It is necessary regardless of whether the individual experiences a disaster or lives in a country in the ‘bottom billion’ struggling through the traps of poverty (Collier 2007). The focus of this paper is not ‘emergency engineering’ but ‘development engineering’. Development engineering is a non-emergency response to those who require basic infrastructure in developing countries. The two fields of disaster relief and international development are similar in many respects, though their strategic short, mid and long term objectives are, or at least should be, vastly different. In times of emergencies, whether natural or man-made, the primary engineering response is to provide safe water by any means necessary. An engineer in this situation has a list of options which can be used to treat and manage water (Lambert & Davis 2002). These technologies are generally intended as short term solutions. These solutions, such as tankering or the use of drilling rigs, involve the engineer making a professional decision on behalf of a community. The central objective is to provide as much potable water as is necessary. The direct application of this engineering decision making process to the field of international development is fraught with systematic problems. In an emergency people have become victims of a crisis. This has made them incapable of dealing with the vast array of problems that they are presented with, and hence their dependency on an emergency relief engineer. During a disaster period consulting a large amount of people before a decision can be made, or a design finalised, would be costly in terms of human lives. In a emergency, particularly
regarding mass migrations of refugees and Internally Displaced Persons (IDPs), the speed of the response is of paramount importance. Anything that is not immediately effective and cannot contribute instantly to the singular objective of survival should be disregarded. In times of an emergency this model of support cannot be criticised, as it is fulfilling its core objectives. Disaster relief however should not be mistakenly regarded as international development.

One of the root causes of bad practice in engineering in international development is in continuing to view those who require support as ‘victims’ who are unable to act on their own behalf. This view has resulted in technologies that are ineffective, inappropriate or unused. A recent survey has indicated that among the 11 Sub-Saharan countries in Africa, only 35%–80% of water systems in rural areas are currently functioning (Sutton 2004). Of 7,000 wells and boreholes surveyed in Tanzania surveyed only ~45% were still in operation; only 10% of the systems survey which were 25 years or older were still functioning (Haysom 2006). The technologies developed on behalf of a ‘victim’ often become unsustainable and irreparable. The India Mark 2 pump (for a tube or hand dug well) is a case in point. The India Mark 2 is one of the bestselling hand pumps in the world; over two million have been installed in India and over 5 million worldwide (Wood 1994). It is supplied to communities throughout the developing world, including sub-Saharan Africa, by many major aid organisations. It boast characteristics such as ‘ease of manufacture and installation’, ‘resistance to corrosion’ and ‘volumetric efficiency’. What it does not possess is the ability for it to be modified or redesigned by local people to suit their needs or an ability to be easily maintained at village level. These pump types have no doubt contributed to the failure rate of water supply projects in development. Much like disaster engineering, the technology cannot be faulted with regards to meeting its core objectives, but it does demonstrate how any working technology or methodology applied out of context becomes inappropriate and ultimately leads to failure.

These technologies are provided on the basis of a ‘needs-based’ response to the problem (Boesen & Martin 2007). A ‘needs-based’ response allows the engineer to identify both the problem and solution without involving the local community. A typical example of the process required for the selection of a technology can be seen in Skinners (2002). At no point it is demonstrated where and when a community has the right to determine their own input and required adjustments. Many of the technologies suggested are engineered remotely and designed independent to the problem. This selection process has led to critical issues with sustainability in the long term. Community participation, where applicable in a needs-based approach, becomes well intentioned manipulation. ‘Participation is undertaken in a manner contrived by those who hold power to convince the public that a predefined project or program is best’ (Duraiappah et al. 2005).

The engineering is not centred on the input of the ‘victims’ and consequently the engineered results often display a complete lack of local cultural understanding. Due to the general lack of engineering education and technical dialogue with the ‘victims’ the solutions are, in turn, generally misunderstood by the local communities. “…that it is precisely this knowledge factor which is conspicuously lacking, that this is the gap, the ‘missing link’ in the whole enterprise.” (Schumacher 1973). Education is considered a secondary objective and mainly focused on health and hygiene practices, though rarely linked directly to the engineering projects.

For a sustainable community development, physical and economic access to quality water as a human right as well as dignity and respect require explicit attention (Laban et al. 2009). This paper takes a holistic view of the problem and suggests an alternative method of supporting, through engineering, those willing to participate in their own development. The first stage in this process is regarding the assistance being provided to communities, in this case potable water, as a provision of a human right. This requires the adoption of a rights-based approach to the problem. ‘A Rights-Based Approach to development sets the achievement of human rights as an objective of development. It uses thinking about human rights as the scaffolding of development policy’ (Maxwell 1999). Putting human rights at the centre of international development requires an approach which characterises more than a single ‘need’. This approach recognises individuals as actors in their own development instead of viewing them as victims. Human rights are complex; their application varies depending on the geographical location, gender, age, creed etc, of an
individual. Therefore by using the rights-based approach, no technology, no matter how suited to a single role that it may be, can be deemed entirely suitable on its own. What is required is the linking of the technology to both community participation and education. This combination is regarded as an ‘integrated method’ for providing water as a human right.

The aim of this paper is to discuss and evaluate this ‘integrated method’ and demonstrate how it contributes to the rights-based approach. Due to time limitations of this research the study would only be applicable to small scale and labour intensive methods of service delivery.

**METHODS**

In accordance with the rights-based approach the ‘duty bearers’ discussed in this paper are those who have accepted responsibility for assisting countries, states, communities and individuals to achieve their rights. This is regardless of them being Non-State or State Actors. In many cases current duty bearers have been shown to attempt individual parts of what is discussed in this paper, though the combination of the goals of technology, education and community participation are rarely intentionally together. The model discussed here is focused solely on the best way to provide water rights to individuals and communities, not in shoehorning the model into the current operational structures of relief and development organisations.

The ‘integrated method’ discussed here is not intended to downplay the necessity of potable water technology, but rather to place it in a context where it can be both effective and sustainable (Figure 1a). This ‘integrated method’ requires two components, working in synergy, to provide potable water as a right. The first is to adopt community participation as a goal for development (Figure 1b). This participation should involve everyone especially those that traditionally would not have a voice in the community (women, disabled, children etc). The objective regarding community participation is to form a ‘partnership’ or achieve ‘active participation’ (Duraiappah et al. 2005). Therefore community participation becomes a core component in the provision of potable water technology, not simply a tool or an inconvenient barrier. The second addresses the issues that remain unresolved by either providing a service or participating directly with the community in a project. This is the provision of education relevant to a potable water project (Figure 1c). This core goal is required to develop the actors in the provision of their rights. Education also creates a platform for developing solutions to long term rights issues. It also allows for the expansion of the capabilities of those participating in a project. This paper discusses the interaction of these three goals and rights ideology as they relate to water engineering. The interaction between these goals defines the sector areas of the ‘integrated method’.

**RESULTS AND DISCUSSION**

Technology: design of an appropriate technology

The introduction of the rights-based approach to current methods of designing appropriate technology is complex. A model for best practice for appropriate technology remains Schumacher’s concept of intermediate technology—‘the poor can be helped to help themselves, but only by making available to them a technology that recognises their economic boundaries and limitations of poverty.’ (Schumacher 1973). There are some inclusions and variations when applying the rights-based approach to Schumacher’s model that must be adhered to. The first is to do with the
inclusion of people in the decision making of the design stages. As stated in Article 2 “The human person is the central subject of development and should be the active participant and beneficiary of the right to development” (DRD 1986). Thus, the initial stages of a design must be discussed and developed fully with the participating community (Boesen & Martin 2007).

The second part of the design of an appropriate technology to be consideration is the influence on the design of a technology from external rights issues. One of the essential parts of the rights-based approach is that rights are inalienable, indivisible, interdependent and interrelated (Eyben & Ferguson 2000). If a solution permits other rights to be enabled (such as the utilising of rainfall which presents an excellent source that can be collected without using labour intensive methods) then this option should be developed. At the design stage as many rights issues should be tabled with the participating community. This should allow discussion on the positive or negative rights impacts the project would have over its life expectancy. Utilising this method would avoid having pre-prepared solutions to problems.

Finally the design process should avoid having a detrimental impact on other rights issues. With the rights-based approach the engineer has the ability to target groups that would not normally be given audience in traditional settings. In particular the participation of women who are often excluded from technical discussions. Article 8 of the right to development states that “effective measures should be undertaken to ensure that women have an active role in the development process” (DRD 1986). As the technology is being provided on a rights basis, there is no reason for continuation with a community if they are not willing to participate fully and insist on discriminating against a particular ethical, cultural, religious or gender group.

**Technology: operation and maintenance**

There is an important relationship between education and technology in the ‘integrated method’. The focus is to allow a community to successfully use and maintain any solution being provided. This has a purely technical focus and is concerned with the medium and long term effects of providing a technical design. “The intermediate technology [should] fit more smoothly into the relatively unsophisticated environment in which it is to be utilised. The equipment [should] be fairly simple and therefore understandable, suitable for maintenance and repair on the spot.” (Schumacher 1973). Providing a sustainable solution ensures that rights issues do not reoccur. To negate the need for education on operation and maintenance is in violation of general comment 15 on the right to water (ICESCR 2002). As part of the ‘integrated method’ technologies that could not be maintained, such as the India Mark 2 pump, or operated sustainably at the village level, could not be considered viable.

One of the essential parts of the rights-based approach is to develop the capacity of the duty bearers (Eyben & Ferguson 2000). When a solution is provided to a community there is a switch between rights holders and duty-bearers. This requires the key actors to take responsibility for the solution that they have been provided with. This would be impossible without education regarding the maintenance of the design. There is a secondary objective in including maintenance of a solution as part of this ‘integrated method’. In many cases the ability to maintain a technology lies with one selected group or individual. This has resulted in the possibility of discrimination against vulnerable groups and in particular, women. This would be in contradiction to many articles of the rights to non-discrimination of women (CEDAW 1979). This could be adverted by giving training adapted to women’s conditions and roles (Wijk 1989). Again, as in the design of an appropriate technology, having this as a key sector would allow the engineer to target specific groups to learn about the maintenance of a technology.

**Community participation: construction with health and safety**

Using a community to participate in the building of a technology is a concept that makes logical sense, both with regards to empowerment and economics. Ownership for a project has been shown to be effective when the community has participated in building a model for themselves. “When the community is involved at every stage from planning to operation and maintenance, and thus has a real sense of ownership of the system from the outset, many costs are
minimized or eliminated.” (UNICEF 1999). This is a fundamental issue when working with a community, as was stated before; the rights-based approach regards participation as a goal for development. “Notably, rights must be defined not only as so much water at such quality but also in the ability to participate in decisions about the delivery of that right” (Brooks 2007).

The success of Kamal Kar’s Community Led Total Sanitation (CLTS) should be seen as a model for participation, especially with regards to civil engineering projects in development. His projects involved working directly with the communities to identify and design solutions to their sanitation problems. This was done without expensive or subsidy driven technology. His model for dealing with open defecation actually showed that subsidies could be a barrier to development. He concluded that the money could be better spent on facilitating, and enhancing the understanding of the community of the problems that they faced (Kar 2003). It suggested that agencies working in development should have full flexibility to allow community to take the lead. The report on CLTS discussed an explosion of innovation regarding the development of the sanitation technologies. These only occurred when the community developed their own ideas and put them to use. Ironically was suggested that it may have been the engineers who created an initial barrier to development because of the mindset of their engineering education (Kar 2003). A similar problem with the engineers from development agencies could be anticipated, though for good reason, in the service delivery of potable water. Problems with water sources, with examples such as fluoride, iron and manganese or radiation, could affect the supply in different ways and could limit the type and simplicity of solutions available. However there is more than one method of participation and more than a single way for an individual to take part in potable water technology. Kamal Kar’s work influences the idea that engineering innovation has a more crucial role when coming from the community themselves. For the integrated model to work the role of the engineer would be required to encourage ideas by providing technical supervision required for the construction and building of a project. This should be done without dictating the ways of achieving the project objective. The focus in a non-complex water source situation would be to facilitate the communities understanding of the problem with a supervisory role when implementing the construction of a technology. In a more complex water source problem this would require the engineer to take the lead but provide as many options as possible, such that the community is fully involved with the implementation of a project.

One of the essential parts of the rights-based approach is that ‘No goal or right can be pursued to the detriment of other rights’ (Boesen & Martin 2007). This is particularly important with regards to projects in international development where projects have to be self monitored. The universal declaration of human rights states that everyone has the right to ‘just and favourable conditions of work’. This is strongly enforced again in the rights non discrimination against women when it states the right to ‘protection of health and to safety in working conditions’ (CEDAW 1979). Health and safety should be of vital importance regardless of whether a rights-based approach is being implemented or not. It should be applicable to all communities and partners that are participating, and should cover all aspects of work that they are undertaking. Agencies working to provide water as a right should be examples of human rights in all areas of implementation and practise.

Community participation: rights based training

Rights-based training involves the discussion of rights and the responsibilities of the duty holders. This type of training is essential to any project which involves human rights. It explains the concept of human rights as well as the roles of the duty bearers and rights holders. The engineers involved in a development project should understand that any infrastructure being provided is doing it at the behest of a local community. As the literature reaffirms these communities have ‘the capacity to manage and dispose of their own resources’ (ICESCR 1966). The rights-based training should be the initial step in a rights-based approach as it provides the community who, in many cases, have been treated as victims, to begin their own process of development and reclaim their dignity. This agreement between the engineer and the community is the first stage in empowering the community as actors in their own development. Its primary focus is to empower those who have been voiceless with an opportunity to speak and be heard. The technology in this
sector area has a secondary role, though the success of an entire project would depend on how well this training was received. The training would also allow those involved in a project to understand the reasons for non-discrimination and would allow a community to tackle its own rights issues. An example would be a discussion on why women, whose duty is traditionally to supply water, should not have the capacity to make decisions about locations or types of wells (Wijk 1989). Without this training there can be no revaluation of project goals when confronted with a rights-based problem. Rights based training would also facilitate long term development as it provides a platform for advocacy to local governments for the provision of water as a right.

**Education: software approach**

The software approach is vital to the efficiency of a potable water supply. The ‘software’ in this context is the health and hygiene teachings that compliment a technology. In potable water supply examples of this would include the difference between safe and dangerous water sources, the purpose of washing of hands as well as the cleaning of certain technical equipment such as the rims of taps on pumps. “Technical developments or improvements will give maximum benefit only if they are part of a wider hygiene education programme. This may involve the changing of long held attitudes and practices and may well take considerably longer to achieve than the actual construction of the scheme” (WaterAid 2006). The teaching of software approaches gives the communities the capacity and tools to deal with some of the problems that beset them. As it deals directly with the life threatening nature of contaminated sources and dangerous water supplies it has much in common with the appropriate technology discussed before. The provision of the software has specific rights Articles that support its inclusion in the ‘integrated method’ of this rights-based approach. These include Article 11 the “continuous improvement of living conditions” and Article 12 for the “the highest attainable standard of physical and mental health” (ICESCR 1966). Similarly Article 24 of the convention of children’s rights state that is the right of the child to “the enjoyment of the highest attainable standard of health”. Given the positive impact of health and hygiene training and its direct correlation to the technology provided it should not be considered separate to engineering, and hence the engineer, in development.

**Education: intermediate education**

“The best aid to give is intellectual aid, a gift of useful knowledge” (Schumacher 1973). Education is one of the core basic human rights. The fundamental basis for education as a right is that it should be free and available to everyone. There is also a call to make technical education generally available (UDHR 1948). Technical education has been specifically targeted in the rights against discrimination against women. It states that women are to obtain all types of training and education, formal and non-formal, in order to increase their technical proficiency (CEDAW 1979). Article 15b of the International Covenant on Economic, Social and Cultural Rights (ICESCR 1966) recognises the right of everyone to “enjoy the benefits of scientific progress and its applications”. However it is children that could benefit most from a focus in education. The convention of rights for children has articles directly concerned with a technical education. Article 17 in particular demands access to information and material from a diversity of national and international sources for the children. In particular it requires material aimed at the promotion of a child’s social, physical and mental health. Technical education is rarely run in conjunction with a potable water technology. This intermediate education material is not to be confused with the teaching of the operation and maintenance of a technology. This education is not intended as an instruction manual on how to use a technology. Rather it is the full educational support for the integration of a technology into a culture. Its fundamental focus is the scientific context upon which a technology works. This includes the teaching of the science, engineering and environmental background behind a technology. An example of this idea would be the lesson taken from a BioSand filter; this could be broken into teachable sections that include the schmutzdecke, basics of sand and water filtration, hydraulic head and turbidity. The objective is not to overrule a nationwide curriculum but rather to support the teaching of sciences and maths. It also builds a foundation for future engineering education. “Countless committees,
task forces, panels, and commissions have already addressed the need and eloquently emphasized that the competitiveness of the country and therefore the general standard of living hinges on the ability to educate a large number of sufficiently innovative engineers” (Tryggvason & Apelian 2002). This variation in teaching could encourage children to attend school and reduce the dropout rate by making technical education relevant to the local cultures. This is supported in Article 28.1e (CRC 1989). The type of education suggested here should be done using the pedagogy as promoted by Freire (1970). The integrated rights-based approach area of education would benefit from his suggested method of the teacher-student and student-teacher techniques for instruction. This teaching style is vital to ‘integrated methods’ success. It also has a direct bearing on the rights of a child. This two way communication would allow the child to make informative decisions about aspects of a technology which affect their lives. Article 12 of the convention of the rights of the child allows a young person to express their views freely in all matters affecting them (CRC 1989). This involvement should not be regarded as a barrier for success. It has been noted in the CLTS projects (Kar 2003) that children are important agents for change, their enthusiasm and work ethic has a huge and positive impact on a project. A classroom continues to be both an excellent platform to engage with children as equals, and an excellent reminder that it is the child that is the priority and future of any country.

CONCLUSION

“There are no-short cuts to developing water projects with communities made up of diverse populations and with conflicting water needs. Such projects are expensive in time, money and human resources but they are essential investments in achieving sustainable outputs which benefit those people whose need is the greatest” (Water Aid 2000).

The rights-based approach would undoubtedly improve development water supply projects, though the required response would be more in-depth and more holistic than the current methods of delivery. The ‘integrated method’ argues that community participation and education should be combined with technology in order to achieve providing water as a human right. Figure 2 presents the combination and interaction of the three goals (technology, education and community participation) and defines six sector areas. The closest goal to each sector indicates the sectors major influence; those further away signify a lesser influence; those on the other side show little or no influence. For example the design of an appropriate technology is mainly a technical issue as it still requires a traditional design process. However it is also has a smaller but crucial role from the participating communities in the design input of a technology. The interaction diagram is important because it changes how engineering is traditionally thought of in international development. The diagram is not simply an imported model from a developed country but a process developed from combining international water development ideology from all the related project areas into one cohesive strategy. The use of this rights-based approach to engineering could start the process of achieving legal backing to providing the level of service required, both in the immediate and long term. The limitation of this ‘integrated method’ is that it combines ideology from a range of sources; therefore it would also inherit the weaknesses of each argument. Participation for example

![Figure 2](https://iwaponline.com/wst/article-pdf/60/10/2713/447163/2713.pdf)
has been shown to increase the difficulty in making a decision (Warner 2006). However following the ‘integrated method’ suggested here in this paper would allow for a potable water technology project which considers the dignity of humans with regards to their civil, social, economic, and cultural rights.

FURTHER STUDY

There are several aspects of this paper that require more detailed research. Each of the sector areas require further investigation into how they relate to human rights law and the current international development engineering sectors. It is also important that studies are done to indicate how the ‘integrated method’ could work with existing intervention methods of State and Non-State Actors. Further studies, such as the socio-economic comparisons to current needs-based responses and the design of rights-based technology would require working directly with the communities that are involved.

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