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Article

Women's Empowerment and Climate Change Adaptation in Gujarat, India: A Case-Study Analysis of the Local Impact of Transnational Advocacy Networks

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Abstract:

1). As on-the-ground projects come into existence and continue to expand to adapt to climate change and empower women, it is important to understand their location within TANs. Using the *Bhungroo* technology as a case study, we aim to assess the potential of TANs to increase the scope and scale of local projects as well as the ability of similar and emerging projects to create social change at local levels. 2). We do so by analyzing interview and earned media hits data from the UNFCCC *Momentum for Change.* 3). We find that while TANs may help increase the scale and scope of projects, increasing their ability to effectively reach more people and areas is still up for debate 4). We conclude by considering how women's political participation may be enhanced by similar projects.

Keywords: Women's Empowerment; Climate Change Adaptation; India; Transnational Advocacy Networks

1. Introduction

Finding sustainable solutions to climate change problems has been a perennial preoccupation of scholars and practitioners [1,2,3]. Throughout the world, climate change adaptation (CCA) activities have emerged on-the-ground to help resolve crises such as floods, food insecurity, and droughts linked to increases in extreme weather conditions [4,5]. Many of these local activities have gained international mass media attention for their innovation and efficiency, including recognition and support from the United Nations Framework Convention on Climate Change (UNFCCC) and partnerships with international organizations such as the International Union for Conservation of Nature and Natural Resources (IUCN). This dynamic is a key component of "transnational advocacy networks" (TANs) [6], which are networks that develop as a result of people-to-people interactions at various levels from local communities to international NGOs.

In recent years, several local projects addressed both CCA and increasing the status of women concomitantly and were recognized and awarded by the UNFCCC's *Momentum for Change* initiative with the intention of drawing attention to the success of the projects and promoting the importance of both gender and climate issues. The UNFCCC offered engagement with policy makers, public relations support, marketing support, and capacity building [5,7]. Highlights such as these tend to increase attention to the projects (in some cases, garner funding) and showcase the projects as examples for future development interventions [6].

Given this spotlight, scholars and practitioners are taking a closer look at these projects, especially given the pressing issues of climate change and how it interacts with gender issues [9,10,11,12,13,14,15,16]. While some projects have been evaluated in the scholarly literature [see 7], this article focuses on one extremely successful project, *Bhungroo*, which began in Gujarat, India, to determine whether the theories scholars propose (in particular those highlighting the effectiveness of TANs and measures to affect social change) are apparent or operative. In particular, we believe it is of theoretical and practical value to learn about how the mass media facilitates the development of TANs. This will enable a greater understanding of how such programs are communicated in the public sphere as well as what aspects are muted and highlighted [6,17,18,19,20]. An evaluation of the *Bhungroo* project provides a backdrop (and perhaps a framework) for evaluating other projects relating to gender and CCA [21].

Our contribution, therefore, is twofold. First, in recognizing the increase of different types of media outlets and news sources in recent years, we aim to assess the potential of TANs to increase the scope and scale of local projects as well as the ability of similar and emerging projects to create social change at local levels. As climate change increases, scholars reflect upon the effectiveness of the strategies that are being used and the elements and considerations they contain (in this case, an increase in women's empowerment and participation).

Second, by evaluating the UNFCCC *Momentum for Change*'s mass media campaign strategy vis-à-vis *Bhungroo*, we address the following components of social change:

- Specificity (Does the mass media describe details of the *Bhungroo* project and/or couch it in larger, amorphous concepts?)
- Appeal (Is the language intended to gain international support and/or does it represent the cultural values and norms of women's roles?); and
- Advocacy (Do the reports also attempt to elicit public commitment and/or acknowledge significant obstacles to social change?)

In this article, we first review the scholarly literature's connections between climate change and gender issues. Second, we introduce the *Bhungroo* irrigation technology developed by social entrepreneurs in Gujarat, India. Third, we define TANs and describe how *Bhungroo* fits within this framework. Fourth, we *evaluate Bhungroo* in terms of Appiah's observed measures for social change. Fifth, we evaluate the effectiveness of the UNFCCC's *Momentum for Change* political campaign strategy. Finally, we speculate on the benefits and limitations of *Bhungroo* in facilitating long-lasting social change.

2. A Literature Review on Climate Change Adaptation and Women's Empowerment

Researchers and practitioners within development and climate change literatures argue that climate change and gender issues are inextricably intertwined [15,22,23,24]. Generally, this is thought to be the case in the developing world where women tend to be less wealthy than men, making them more vulnerable to climate change impacts [1,23,8]. Additionally, because of the common social positions of women as caregivers, homemakers, and food, water, and wood producers and gatherers, they tend to experience the impacts of climate change more often and therefore have reason to find ways to adapt and promote sustainable solutions [22,24,25,26,27,28,29,30].

Though the interaction between women and climate change obviously varies by level of income, nation, region, state, and level of urbanization—among others—local and international program managers integrate gender mainstreaming into CCA interventions [22,23,31]. On the other hand, analysts question the effectiveness of this integration because inter-governmental and

international non-governmental organizations (INGO) use a top-down approach and do not use appropriate and sustainable solutions on-the-ground [32,33,34,35].

It appears that women-centered projects that are developed "on-the-ground" (i.e., within the geographical region of intervention) generally are viewed more favorably because they do not essentialize women and, instead, take into account local factors such as customs and laws to create sustainable solutions [7,10]. On the other hand, localized projects may be too small in scale and scope to make a difference outside of their communities [36,37].

Additionally, in many countries in the developing world, there is serious resistance to women participating in public life [30,38], though the severity varies by the strength of traditional practices and levels of democratic governance [15,31]. Several barriers to women's political participation, including a lack of education, also may make it difficult for women to lead and participate in CCA projects [39,40].

As will be discussed below, scholars recognize that TANs are essential in providing funding, support, and outreach as well as pressuring states and governments to become more gender equitable or introducing other local women to such projects [10,11]. In this study, we hope to demonstrate that on-the-ground projects can expand in scale and scope when they become connected to TANs. In the next section, we introduce our case study –the *Bhungroo* irrigation technology, which in fact does address both climate change adaptation and gender equality concomitantly.

3. An Introduction to *Bhungroo* Irrigation Technology

The *Bhungroo* irrigation technology, developed by Trupti Jain and Biplab Paul in Gujarat, India aims to empower poor women and improve food security, disaster preparedness, and income generation through water technology usage [41,42]. The technology is housed under the non-governmental organization, also referred to as a "social enterprise," Naireeta Services Private Limited (NSPL), and headed by Trupti Jain and Biplab Paul. While Naireeta Services began in 2000, the actual irrigation technology program took over a decade to streamline and formalize [41,43].

Trupti and Biplab developed the *Bhungroo* irrigation technology in response to the 2001 earthquake, which led to water scarcity that was followed by the monsoon. Over time, they improved the *Bhungroo* irrigation technology as a solution to steady farming in both dry and wet seasons—which both harvests and stores water for irrigation [41,43]. In simple terms, the technology helps mimic part of the natural hydrological cycle whereby water is gathered in the ground (or recharged) and then used to water crops, as well as keep the soil moist.

This entirely sustainable solution is paired with the need to improve livelihoods of poor and semi-illiterate rural women. Naireeta Services and their partner organizations train women to use the technology and teach others, which widens their skillsets. Additionally, women are responsible for managing the technology, which helps improve their social power, especially because the majority of women do not have land rights in Gujarat. According to Trupti,

"The small farmer holds less than one hectare of land and, in our arid region, the land is in the name of the man. In India, women don't have land rights. I have tried, by working with NGOs, to give land rights in the name of the women, but we are not succeeding in that. Only the 2% of women – those who are the single child of the family – can get that. That's the official situation."

From the above information, it is clear that Naireeta Services could not help women gain land rights. Trupti discusses how Naireeta Services tried to work with NGOs to receive support to reach

their goal, and that it was not enough. As a result, a very small percentage of women even had the right to own land, which would make it difficult to increase women's roles and improve their lives and gender relations in the area. Despite the "official situation" Trupti describes yet another layer of social stratification in which the majority of small farmers became laborers for rich farmers. Trupti describes this as follows:

"…Without water, they are not able farm the land. These farmers have to purchase the water from the others, which is very costly. So, although they have the land, they are working the land as laborers of the rich farmers. So we don't have the irrigation facilities. They are working as laborers for the rich farmers."

As exemplified in the preceding statement, the dry season made it difficult for farmers to use their land. As a result, the small farmers needed something to improve their situation given the difficult weather patterns and the poor terrain resulting from issues related to climate change. According to Trupti, this is where *Bhungroo* came in to "take care of the land" when environmental conditions are unsuitable for farming. However, the critical addendum to the solution was improving the lives of the women in these small farming communities. While conveying the emergence of the idea to give the *Bhungroo* irrigation technology rights to women, Trupti said,

"We have been working as an NGO for 18 years in the village and we wondered why not give the rights to the *Bhungroo* technology to women only? Women will never have land rights but the unique feature of the *Bhungroo* technology is that the women get the rights to the technology. So, our NGO told the farmers that they are able to use the *Bhungroo* technology on the condition that women hold the *Bhungroo* rights."

Giving women the rights to the *Bhungroo* technology was a significant step toward giving women the control over their natural and social environments. Even though women do not have land rights, they now had rights to the tools that the farmers need to make the land useful. Thus, farmers can make their land usable if they allow women to be in charge of the technology. Working around the government's denial of giving women land rights was sustainable and actually empowered the women. They received ownership, but also learned how to use, supervise, and teach the technology. Trupti expands on this by stating that,

"…The women have to supervise the construction of the *Bhungroo*. We give them all other things and they contribute in the *Bhungroo* elections as labor workers. After the elections, the women basically are distributing the water so that they are managing the group of women farmers and the distribution of the water in that area. This is the role of the women."

Women are given the tools necessary to use and distribute and manage the technology. Their role is therefore twofold, to help their communities adapt to difficult land and weather conditions and give them the power to decide where the water goes and when. Women can then use this power as leverage in their communities and families.

As their connections with other organizations and funders grew, so did the scale and scope of Trupti's and Biplab's creation. For instance, their *Bhungroo* technology and services have received several awards including the national DST Lockhead Martin India Innovation Growth Programme Innovation Award; regional recognition from Syngenta Agriculture Social Enterprise Award; the DBS-NUS Social Venture Challenge Asia Award; and international acknowledgement from UNFCCC *Momentum for Change*'s "Women for Results" Award, the Cartier Women's Initiative Award, Buckminster Fuller Challenge, among many others.

To accomplish their goals of adapting to the land and empowering women in Gujarat, as well as expanding the technology to other areas in India (Uttar Pradesh, Maharashtra, Karnataka, Andhra, Jharkhand and Bihar), and internationally (to Bangladesh, Ghana, Togo, Zimbabwe, and Madagascar), Naireeta Services has partnered with the governments of India and Togo, and several national and international organizations. It also partners with the Aquatech Cropping Produce Livelihood (ACPL), Cartier Women's Initiative Awards, and Securing Water for Food (SWFF), among others, and is a "knowledge partner" with Sustainable Growth Initiatives (SGI), Conservation Alliance, and Lokvikas NGO.

Naireeta Services has received funding and support from large and growing foundations such as the Rockefeller Foundation (private foundation that funds various philanthropic causes) and the Deshpande Foundation (NGO that works on large-scale projects in India and US), government partnerships including UKAID/FICCI (UK development partnership with India) and SWFF (Securing Water for Food is an international organization funded by USAID, the South African Department of Science and Technology, Sida (Swedish International Development Cooperation Agency), and the Foreign Ministry of the Kingdom of the Netherlands to invest in water/food innovations), as well as the Indian Government (i.e. the Uttar Pradesh Government and Bihar government) and GIZ (German development agency).

In sum, the *Bhungroo* program seems to have reduced the impact of climate change in the region, increased the political participation and social status of local women, and promoted a cross-cutting innovation internationally. In this next section, we define TANs and contextualize the *Bhungroo* project within these afore-mentioned networks.

4. Transnational Advocacy Networks (TANs) and the *Bhungroo* Project

TANs can be described as chains of advocacy, support, and/or outreach that tend to revolve around large normative global issues, such as climate change or gender equity [6,21]. Conceptually, TANs are used to describe a process by which support is given and received through multiple intersecting channels across the world. These interactions between people and organizations are part of a global and local effort that addresses various global problems.

There are five key elements of TANs as described by Keck and Sikkink. TANs are: 1) organic and not hierarchical structured, 2) initiated from outside the country and promoted at the ground level inside the country, 3) involve several different actors, and place both international and domestic NGOs at the center, 4) indicated through the formation of dense webs of connections that continually are redefined, and 5) facilitate the launching of mass media campaigns specifically to influence public opinion.

Below we describe how each of the above five elements applies to the *Bhungroo* technology under the rubric of climate change and gender equity.

4.1. TANs are organic and not hierarchically managed

Our research indicates that the networks developed around *Bhungroo* have no obvious hierarchy. For example, Trupti Jain, a life-long resident of Gujarat, first introduced the irrigation technology and worked within the community to develop a strategy that would both help farmers and empower women. With input from that community, she and her husband, Biplab Paul, who had resided in Bengal, developed a local NGO, Naireeta Services Private Limited. They employed nine professionals and attracted 23 volunteers, which led to the formation of local "self-help groups" within a communal structure. Therefore, at its inception, this project did not use a "top-down" approach to improve climate change adaptation and gender equity but instead was designed to

solve a local problem. As it gained momentum and expanded outside of the immediate community, this element of TANs became integral to its success.

4.2 TANs are initiated from outside the country and promoted at the ground level inside the country

While the *Bhungroo* program was not initiated from outside of the country, it did fit into larger external networks that already had been formed around climate change and gender equity. Within this context, it is easy to understand why Trupti became a Rockefeller Fellow and Biplab was named an Ashoka Changemaker. It is not surprising that, by 2017, they received the Buckminster Fuller Global Challenge Award and continue to gain recognition and support for their work inside India (including Uttar Pradesh, Bihar, West Bengal, Karnataka, Gujarat, Madhya Pradesh, Rajasthan, and Haryana).

4.3 TANs involve several different actors, and place both international and domestic NGOs at the center

Both international and domestic NGOs were crucial to the success of the *Bhungroo* project. Since 2014, when NSPL (aka Naireeta Services) received international recognition through the UNFCCC *Momentum for Change's* "Women for Results" Award, the *Bhungroo* project gained many new partners. The UNFCCC's 25-member advisory board, comprised of individuals from around the world, facilitated the introduction of the irrigation technology in parts of Asia and Africa. As the project evolved, not all interactions, even within Gujarat, were positive. We will discuss this in the social change section below. However, the involvement of several different international and domestic actors created a synergy that continued to focus on the work of the international and domestic NGOs.

4.4 The presence of TANs is indicated through the formation of dense webs of connections that continually are redefined

It is almost impossible to *track Bhungroo's* webs of connections, first, because of the complex synergy that has been created within the project and, second, because of how it has been integrated into the larger networks of climate change and gender equity. The fact that *Bhungroo* continues to gain recognition and secure awards is significant. In addition, the nature of the problem – as a global environmental challenge – means that the webs of connections are continually and incrementally redefined as people continue to become aware of the effects of climate change. For instance, Oxfam identified the *Bhungroo* technology as critical to helping farmers adapt to the negative impacts of climate change they will continue to face. In the Oxfam report, Biplab Paul acknowledges that India faces drastic unpredictable weather conditions and resulting droughts and food insecurity,

"*Bhungroo* is a small step in the right direction. It's a solution that's easy on the pocket for farmers, and easier to maintain as well."

4.5 TANs facilitate the launching of mass media campaigns specifically to influence public opinion

A concrete indicator of the presence of TANs is the UNFCCC's *Momentum for Change* media strategy, represented in Table 1, which was used to promote *Bhungroo*.

Table 1.

UNFCCC's *Momentum for Change* Information Politics Strategy

Ⅰ. Engagement with policy makers
- Recognition by the UNFCCC secretariat
- Attendance to UN Climate Change Conferences
- Opportunities to present work to policy makers during the UN Climate Change Conferences
Ⅱ. Public relations support
- Concentrated media engagement effort prior to the UN Climate Change Conferences, including placement of opinion pieces and earned media
- On-going digital campaign, including social media, email marketing and promotion on UNFCCC website
Ⅲ. Marketing support
- High-quality promotional videos and podcasts
- Dedicated webpage on the UNFCCC website
- Publications such as annual reports and brochures
- Graphic assets such as infographics and photography
Ⅳ. Capacity building
- Professional media training during the United Nations Climate Change Conference

Source. http://momentumforchange.fluidreview.com/res/p/essential-information; also taken directly from [7]

Because of the explosion of social and other media outlets, it is difficult to track all the media hits relating to *Bhungroo.* According to the lead communications officer in the *Momentum for Change* initiative, earned media hits are part of an ongoing communications campaign and public relations support to drive attention to winning activities. This includes promoting *Bhungroo* through social media, as well as producing a promotional video (https://vimeo.com/125792111) and publishing the UNFCCC's annual report online.[1]

Taken together, the five dimensions of TANs mostly resonate with and can help locate the *Bhungroo* project within a larger global network of climate change adaptation and gender equity initiatives. Considering how Naireeta Services fits within a larger global structure helps *theoretically* ground what TANs are and how they facilitate both local and global goals. Additionally, it appears that TANs helped increase the visibility and funding of Naireeta Services so that it could expand its geographical range and scope. Through TANs, *Bhungroo* technology has been promoted as essential to reducing urban migration, improving food security and increasing women's political participation in several areas [43,44,45].

5. Appiah's Social Change Measures in *Bhungroo* Irrigation Technology

The ability of this project to promote social change is essential; otherwise, bridging the project's connections within TANs and increasing its geographical range and scope would be nonsensical.

[1] Sarah Marchildron, email communication, April 25, 2018.

Therefore, in order to assess the *Bhungroo project's* ability to create social change at the local level, we apply a common model of social change established by philosopher and cultural theorist Kwame Anthony Appiah.

In order to detect the presence or absence of Appiah's social change measures, we compare six media reports published between to 2015 to 2017 to our in-depth interviews with Trupti and Biplab. Short of conducting field research in Gujarat over an extended time period and across several generations, it is possible to analyze the language that is used in the public sphere to predict the *likelihood* that fundamental social change is occurring in terms of women's political empowerment. According to Appiah, the development and support of on-the-ground organizations is crucial. He posits that fundamental social change occurs when:

1. The community signs a pledge to change;
2. It establishes an organization (e.g., a local NGO) so as to combat isolation;
3. The organization elicits promises from the younger generation to support the change;
4. The organization builds networks inside and outside the country;
5. The organization speaks the language that people revere;
6. The community (and the associated organizations) define the "new normal;"
7. The program is *not* linked to a larger, amorphous concept;
8. The government is not the primary instigator (i.e., doesn't make laws to force change);
9. "The change" is based on respect, not self-congratulation;
10. The community and public-at-large is committed to the change; and
11. Old practices are replaced by something new.

A few of Appiah's measures above describe the changes that occurred in Gujarat after the technology was introduced. First, although the community did not sign a formal pledge, it was involved at the very beginning of the project. Second, after some time, Trupti and Biplab formed the domestic NGO Naireeta Services to house the *Bhungroo* technology. Third, it is not clear that the organization promised the younger generation anything to garner their support. Fourth, the success of the *Bhungroo* technology, which was started by a local NGO and supported by intergovernmental organizations, led to its implementation in other countries in Africa and Southeast Asia. With nearly 18,000 women benefiting from this technology in India, this work presumably increases the political participation and social position of women even if patriarchal land rights remain. There is also media outreach that continues to build networks outside of the country. Fifth, obviously the organization speaks the local language, Gujarati, as one of its founders is from that state.

It appears that the sixth measure of social change most closely resembles the efforts of Naireeta Services to promote social change. For example, the success of the organization and technology allowed for the community to define the 'new normal' in terms of gender relations. Our interviews with Trupti and Biplab also indicate that local women have become empowered to become involved politically in their community. Women owned the technology which made the land usable. This helped them increase their social position within their families and allowed them to take seats in their local government or panchayat, which were already reserved for them. Trupti said:

"Our many women have been in contested elections at the local Penjyad (the village governing body) in the village of Mehtan. In India, in 1992, the 70th Amendment was passed in the constitution of India. So now the 70th Amendment is saying that at least 33% of the seats for the Penjyad (the village governing body) are reserved for women only. What *was* happening was that the dummy candidates had been put on the Penjyad because men don't know that the seats were reserved for women; and, even if they did know they don't know how to work it out and make the decisions. So, in the name of the women, only men were always working in the Penjyad."

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Though the government made it so that women were to be represented in local government, there was a disconnect in its adoption. Men took the place of women anyway even though the law aimed to include them. However, according to Trupti, the *Bhungroo* technology enabled the women to become empowered politically. Trupti said:

"But *now* after the *Bhungroo* technology, all the beneficiaries are women; and they were empowered to take the decisions at the household level. And so they thought, why not also make decisions at the village level? Women want to take part in the micro planning process by contesting the election in the Penjyad. Women consistently take elections to stand in the Penjyad elections and the contested elections are in front of all the male members. The women members are based on the party. They take the positions that they want to work for the Penjyad – they stood for it."

The technology empowered women to take on political positions to improve their households and village. Having women now represented in local government in this area may eventually help with other gender relations; however, it was the technology rather than the law that allowed for this social change. This also exemplifies the eighth measure of social change.

Seventh, though the program is obviously linked to a larger concept of climate change adaptation and gender equity, the program goes about achieving change within the context of its origination. For instance, the technology helped circumvent women's lack of land rights to overcoming gender inequity in land rights by giving them the technology that made the land useful rather than continuing to fight for formal land rights.

Eighth, as exemplified earlier, the government was not the instigator in this project, although it now supports areas of the project and organization. Therefore, one advantage of *Bhungroo* is that it recognizes that social change will not come from passing laws. Ninth, though the project has earned many sought-after awards, the organization does not self-congratulate and continues to grow and expand its efforts. Tenth, while not everyone in the community or the world is on board with climate change adaptation and empowering women, *Bhungroo* specifically identifies the poorest women who can benefit from the technology. This is a key area where the success of the program at large may be held back in terms of reaching and helping the largest number of people possible.

Eleventh and lastly, old practices of women not engaging in local government were replaced with women taking the initiative in these matters, so they can work on what is needed. For instance, Trupti communicated to us the following:

"Women took the lead not only in *Bhungroo* but also put efforts in negotiating with local government machinery to find and implement the appropriate government program within the village viz, the government programs focus on pond-digging work but the villagers know that that is not the right solution. So lots of money has been wasted. The women have seen this and now say that if they are in the panchayat, they can stop these kinds of things and work on what is needed."

By getting women involved in the *Bhungroo* projects, they began to negotiate with the local government to fund more relevant programs to the issues they experience. Therefore, less money will be wasted on unfeasible or unsuccessful projects from the state and more focus will be put on programs that are appropriate for the needs of the community.

Below we take a closer look at the language used in news reports to explain how some of these social change measures have appeared in the news and, hopefully, shed light on the dynamics of social change and the long-term trajectory in Gujarat.

6. The Effectiveness of the UNFCCC *Momentum for Change's* political campaign strategy

Bhungroo's receipt in 2014 of the *Momentum for Change* "Women for Results" Award from the UNFCCC led to the implementation of a mass media campaign of "earned media" (i.e., articles in key new sources around the world) in the *Times of India*, The *Daily Star*, and *Forbes* between 2015 and 2017. This campaign is one component of a larger but significant part of the UNFCCC's information politics strategy to promote the work of the *Momentum for Change* awardees. Our analysis of the language used in six of the publications helps us to determine whether three crucial elements, derived from Appiah's social change measures above, appear to be operative: specificity (i.e., Do the articles describe the project or couch it in larger, amorphous concepts?), appeal (Is the language intended to gain international support and/or does it represent the cultural values and norms of women's roles in Asia?), and advocacy (Do the articles attempt to elicit public commitment and/or do the articles acknowledge the significant obstacles to social change?).

6.1 Specificity

One 2015 news report written by S. Aijaz [44] in *Social Story* illustrates the first measure of social change, detailing the extent to which the local community in Gujarat became involved in *Bhungroo* and how it was being used in other parts of India, as below:

"*Bhungroo* is executed through community cultivation not just to protect farmers from being exploited but to make a secure future for women. At least five poor women smallholders enter into a pre-agreement that they'll jointly manage their *Bhungroo*, share irrigation water and contribute to labour in each other's lands. The *Bhungroo* year-one installation cost starts at INR 9 lakhs. One *Bhungroo* unit can last for 20 years. With this cooperation, it can cater to 21 acres of land during both monsoon and winter."

The news reports consistently provided visual and technical details on how the irrigation technology works as well as how it can be used in different geographical regions, for example, in *The Better India* posted by Tanaya Singh [43]:

"The high salinity of soil in arid regions of Gujarat and other states creates an impermeable layer that prevents rainwater from seeping in. This leads to water logging and the standing water again increases the salinity of the soil. *Bhungroo* helps farmers in such rain-scarce and salinity-prone areas. The system consists of a pipe erected in such a way that excess water passes through it, gets filtered and accumulates in an underground well. Later, farmers use a motor to pump the water up and use it for irrigation…. The underground reservoir can hold 40 million litres of water and can supply for as long as seven months. Additionally, the non-saline rain water, when mixed with the underground saline water, brings down the salinity of the groundwater and makes it fit for agriculture."

In addition, the reports use Mahatma Gandhi's principles that speak the language that people revere – the fifth measure above in Appiah's social change theory, for example by S. Aijaz in *Social Story* [44], who quotes Trupti Jain:

"That is the precise objective of Naireeta Services," says Trupti. "We are trying to follow Mahatma Gandhi's principle of Antodaya, i.e., serving the last person in the queue in the best possible way."

One area of concern, however, is when the language becomes too intertwined with the program, as represented in the seventh social change measure above. One example of this, from the

Forbes #New Tech news report by Suparna Dutt D'Cunha [46], who quotes Biplab Paul using the amorphous terminology of "sustainable development" and "food security:"

"We are now going to focus on 12 drought-prone states of India, and by 2022, we aim to cater to 1 million farmers, which will help in inching closer to the UN initiative of sustainable development goal of food security for all."

If the concepts are intended for an international and not a local audience, then it seems that the potential for social change in Gujarat would not be adversely affected. However, over time, there may be tension between the presumably "local" language of Gandhi and the global language of environmental sustainability if, as discussed below, the cultural values and norms of Gujarati women are not acknowledged.

6.2 Appeal

From the online publication, *Your Story*, S. Aijaz [44] describes the way Trupti and Biplab dealt with resistance in the Gujarati community:

"Trupti had to face a lot of opposition from the men folk who were particularly against *Bhungroo* being centred around women. Trupti says, "NSPL was non-negotiable on this subject; male members were migratory, so they had little knowledge on what their wives were doing for water." It took a few years for them to relent. Trupti also had to contend with vested business interests who opposed *Bhungroo*. To them, Naireeta Services [NSPL] was trying to jeopardise their monopoly and land-capturing schemes…Naireeta's problems were seemingly endless. "Nearly moneyless smallholders were not able to mobilise a single penny for the work," says Trupti. Women had to be convinced to take part and involve their families to install *Bhungroo*."

This kind of resistance may not be mediated by appeals from international organizations because the *Bhungroo* program aims to alter and replace well-established socio-cultural norms. The community is comprised of semi-literate farmers and laborers who need to see the benefits of the new practices, as represented in the eleventh social change measure in the previous section. Essentially, the news report in the *Times of India,* which lauded the program for getting global recognition at the UN Climate Change Conference (UNCCC) in Lima, is of little practical value at the community level.

On the other hand, the *Forbes #New Tech* article filed by Suparna Dutt D'Cunha [46] reports that appealing to both regional and international communities facilitate the expansion and refinement of the *Bhungroo* program. For example, *Bhungroo* has gained recognition from the South Asian Association for Regional Cooperation (SAARC), which is particularly important because the SAARC focuses on helping rural communities that are struggling to survive, as described below:

"So when a few showers fell in mid-July in Latur, one of the hardest-hit areas, the 47-year-old ran outside to plant pulses and sweet potatoes, scattering seeds, and pushing vines into the moistened earth. For the last six months, Patil and his family of eight have relied on one meal a day, while many desperate farmers have killed themselves – more than 400 farmers committed suicide this year, and more than 2,000 in 2015."

A news report by Sushmita S. Preetha [47] in *The Daily Star* in Bangladesh used language that integrated local and global issues. On the one hand, it mentioned that the *Bhungroo* program focused on improving the lives of the poorest women who would then be enabled to become involved in the political process [48]:

"The beneficiaries are identified following a thorough three-tiered selection process: first, the women of a given village identifies the poorest woman in their community; second, the list is crosschecked by women from surrounding villages; and finally, the list is vetted again at the sub-district level to ensure that the intervention reaches the targeted community…"Our beneficiaries had annual income less than USD 120. Today, they are earning USD 800-1000 every three months. Everybody has settled their loans. They are living secure lives, and are even taking part in the political process," says [Biplab] Paul."

On the other hand, the *Daily Star* [47] also reports that on how and why *Bhungroo* received international recognition:

"What is more, as the United Nations Framework on Climate Change Convention (UNFCC) notes, "by curtailing desertification, the technology helps to build resilience to climate change and to rejuvenate local biodiversity." As such, it doesn't simply benefit the direct beneficiaries, but also the local communities by facilitating more crop, biodiversity and nutritious food, an outstanding feat which won *Bhungroo* the UNFCCC's *Momentum for Change* award."

Taking all of the social change measures into account, it seems likely that the international recognition and on-the-ground attention are complementary in Gujarat. However, as will be discussed in the conclusion, it is not quite clear that the political participation component will be transferable to the diverse countries in Asia and Africa without substantial modifications to individual communities.

6.3 Advocacy

Finally, a vital component of social change is whether a particular program elicits public commitment and, at the same time, acknowledges the obstacles. *Social Story* does provide a clear description of the benefits and challenges of the *Bhungroo* program and this is also the case in *The Daily Star*. In another media hit from an inspirational online news source, *The Better India*, Tanaya Singh [43] described how Biplab became involved in the *Bhungroo* program:

"During relief work after the earthquake, he organised women from the villages to develop a remediation plan for their water issues. This was when he realised that if mobilized, women can lead to high-impact social change. He developed the *Bhungroo* technology in the year 2000, and it took 14 years to streamline the process after many trial and error sessions."

In this advocacy framework, the report cites Biplab in describing the power of combining international and community organizations, which mirrors our study of TANs:

"Now, with knowledge guidance from *Ashoka India*, a network of social entrepreneurs worldwide, the organization has adopted a partnership model. Different NGOs, cooperatives, institutions, CSR wings of organizations, etc., partner with Naireeta Services to become carriers of the technology. The entire process of setting up *Bhungroo* is led by women. Naireeta Services, or partner organizations, train members of women Self Help Groups (SHGs) in different villages."

7. The Benefits and Limitations of *Bhungroo* in Facilitating Long-lasting Social Change

As on-the-ground projects come into existence and continue to expand to adapt to climate change and empower women, it is important to understand their location within TANs. We argue that TANs may help increase the scale and scope of these projects, increasing their ability to reach more people and areas. This process is made possible through several avenues we reviewed in this article, such as building partnerships and receiving funding and awards internationally such as the

UNFCC. While increased funding and technical support is critical to scaling up and expanding out projects (in this case the *Bhungroo* project), media outreach also is essential to the expansion of TANs, so the activities can grow. As the project proceeds, three questions remain.

First, we need to learn more about how the *Bhungroo* technology has transferred to different countries and regions. Trupti and Biplab have discovered multiple uses of the technology – in areas that are either too wet or too dry – but it is not yet clear whether *Bhungroo* will be a primary answer, even in a small way, to climate change adaptation.

Second, we wonder whether the *Bhungroo* program will be managed in such a way that a "new normal" in terms of women's political participation and social status will be established. Perhaps there are different practices in terms of women's roles and even a different dynamic between farmers and laborers in different countries in Asia and Africa. In order to be functionally equivalent, TANs would need to be fully operative and include "champions" within communities. Furthermore, local NGOs will need to ensure that the program utilizes local women's strengths and perspectives. One legacy from the *Bhungroo* project is that Trupti and Biplab are thoroughly committed to keeping both climate change and gender equity at the forefront.

Finally, it is not apparent, even in Gujarat, that future generations of women will assume leadership roles as "rightful heiresses" or that the local community will accept input from younger generations. Is there enough of a track record in the *Penjyad* (the village governing body) for women to continue to hold political offices? Will the communal structure facilitate or thwart women's political participation? With the obvious success of *Bhungroo* especially in terms of the complexity and density of transnational networks, we are cautiously optimistic.

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References

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