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The Need for Co-evolution of Groundwater Law and Community Practices for Groundwater Justice and Sustainability: Insights from Maharashtra, India

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ABSTRACT: With groundwater becoming the mainstay for meeting water requirements for life and livelihoods, countries around the world are experimenting with law reforms in order to establish some guiding rules for its use, distribution and protection. A fundamental question about law reforms is the degree to which they incorporate justice and sustainability. This article, in responding to this question, focuses on Maharashtra, India. We base our response on a content analysis of the 2009 Maharashtra Groundwater (Development and Management) Act; the 2018 Maharashtra Groundwater (Development and Management Draft Groundwater Rules;[1] and a village case study. Primary data was collected in Pune, Mumbai, and Hivre Bazar village; this included an empirical analysis of 47 in-depth interviews, participation in a number of village meetings and open-ended discussions, and direct observations of groundwater practices. Our analysis led to three conclusions. First, the 2009 Groundwater Act and the 2018 Draft Groundwater Rules are primarily driven by concern for sustainability of the resource, especially in areas where the water table is steadily declining, but when it comes to groundwater justice, no proactive measures are suggested in either the 2009 Groundwater Act or the 2018 Draft Groundwater Rules. Second, there are certain core factors identified at the local level that we believe to be fundamental in facilitating sustainability and – to a lesser extent – groundwater justice. These factors include a community's ability to: (1) acknowledge that there is a crisis and display a willingness to engage with it; (2) create a rule-bound community groundwater resource; (3) demonstrate leadership and the feeling of community; and (4) utilise awareness, information and knowledge. Our third conclusion is that there is a need for the co-evolution of community practices and state-led groundwater law; such a co-evolution has the potential to put in place arrangements around groundwater that can support both groundwater justice and sustainability.

KEYWORDS: Groundwater justice, sustainability, groundwater law, practices, India

INTRODUCTION: THE IMPORTANCE AND VULNERABILITY OF GROUNDWATER

Groundwater has become increasingly important for irrigation, both in terms of providing insurance against drought for rainfed crops and allowing for more frequent and widespread cultivation in dry regions; indeed, the use of groundwater has often been a key factor in promoting the installation of irrigation systems (Shah et al., 2008). The relevance and socio-economic impact of groundwater, however, goes beyond irrigation, as groundwater is also used for domestic, industrial and commercial purposes. Indicators point to the serious deterioration of this important resource (WWAP, 2012; Shah

[1] Rules that follow the Act provide the details as how to operationalise the Act.

2008), one of the reasons being the unprecedented ease and low cost of new groundwater pumping technologies. Aquifers are rapidly both deteriorating in quality due to pollution and declining in volume.

In many places around the world, besides groundwater's deterioration, (in)equity of access is a matter of concern. While groundwater extraction is increasing almost everywhere, access and distribution has not necessarily improved. Studies of groundwater access and distribution and of exposure to polluted groundwater often reveal that while the current state of groundwater resources is alarming, it is – at least for the moment – sufficient to meet global needs; studies further reveal, however, that the main problem is inequality of access (Boelens and Vos, 2018).

In order to address groundwater deterioration and inequity of access and distribution, governments in both the Global South and Global North are experimenting with law reforms to better regulate groundwater (Cuadrado-Quesada and Gupta, 2019). Since one of the core purposes of progressive laws is the increase of public good – or at least to give that appearance – different governments around the world are undertaking groundwater law reforms to address inequity and sustainability issues and to demonstrate their concern for the interests of their populations. In this article, we intend to examine and reflect on the recent law reforms related to groundwater in the Indian state of Maharashtra, specifically the 2009 Maharashtra Groundwater (Development and Management) Act (referred to hereafter as the '2009 Groundwater Act') (Government of Maharashtra, 2009), and the 2018 Maharashtra Groundwater (Development and Management) Draft Rules (referred to hereafter as the '2018 Draft Rules') (Government of Maharashtra, 2018) which operationalise the Act. We argue that if the overarching objective of such reforms is to usher in a groundwater governance system which engages with concerns for groundwater justice and sustainability, then the state-led law reforms and community-led practices need to talk to each other rather than it being a question of one or the other. We are particularly interested in answering the following research questions: are the above-mentioned groundwater law reforms in Maharashtra addressing groundwater justice and sustainability concerns; how are they doing so; and how can they more robustly include justice and sustainability.

We look at India because it is the largest groundwater user in the world, with about 40 million private and public wells (Garduño et al., 2011). The extensive extraction of groundwater over the past 50 years has led to its unprecedented depletion. About 90% of rural drinking water comes from the nation's aquifers, 70% of irrigation is groundwater dependent, and 50% of the water supplied to India's cities is sourced from groundwater (Narain, 2012; India, Ministry of Agriculture, 2013; Shah and Kulkarni, 2015; Ministry of Agriculture, 2018; CAG, 2018; Vijayshankar and Kulkarni, 2019). We focus particularly on the state of Maharashtra as it has positioned itself as the country's 'model' state for water law and policy reform. Maharashtra started its water law reform in 2003 with the Maharashtra State Water Policy; this was followed by the 2005 Maharashtra Water Resources Regulatory Authority (MWRRA) Act and, also in 2005, the Maharashtra Management of Irrigation Systems by Farmers (MMISF) Act. These were followed by the 2009 Groundwater Act and, almost a decade later, by the 2018 Draft Rules. It is in this context that we critically look at the newly initiated law reforms around groundwater in Maharashtra. Our focus is on the 2009 Groundwater Act and the 2018 Draft Rules.

We use a combination of research methods. First, we draw on a desktop analysis of the literature on common pool resources, water justice, and sustainability; second, we provide a content analysis of the 2009 Groundwater Act and the 2018 Draft Rules; third, we conduct a case study of Hivre Bazar in western Maharashtra. Primary data was collected in Pune, Mumbai, and Hivre Bazar in 2017; it included a combination of 47 in-depth interviews with government officials at different levels, as well as with community leaders, local residents and non-government organisations (NGOs). Participant observations, direct observations, and open-ended discussions were made during a number of village activities such as meetings of the gram panchayat, which is rural India's elected, village-level governance/administration institution.

The paper continues with background on the Maharashtra water law and policy reforms journey and its limitations. It then introduces the theoretical framework and concepts mobilised in our analysis. From there, it critically examines the 2009 Groundwater Act and the 2018 Draft Rules, where we discuss whether and how these reforms are fostering groundwater justice and sustainability. The case study of Hivre Bazar is then presented, followed by a discussion that highlights the need for a co-evolution of community-led groundwater-related practices and state-led groundwater law reforms. Finally, conclusions are offered.

THE STATE OF MAHARASHTRA, INDIA: A 'MODEL' FOR GROUNDWATER LAW AND POLICY REFORM?

Maharashtra's groundwater-related law reforms were preceded by an overall process in the state's water sector. As mentioned earlier, this included the passing into law of the 2003 Maharashtra State Water Policy and was followed by the ratification of two other important laws, namely, the 2005 Maharashtra Water Resources Regulatory Authority Act, and the 2005 Maharashtra Management of Irrigation Systems by Farmers Act. With the MWRRA Act, Maharashtra became the first state in India to bring an independent regulatory system into the water sector. It should be noted that prior to introducing these two important laws, the Government of Maharashtra (GoM) launched the Maharashtra Water Sector Improvement Project (MWSIP), with the help of a US$ 325 million World Bank loan (Joy and Kulkarni, 2010). The World Bank support of MWSIP did have a bearing on some of the provisions of both the MWRRA and the MMISF Acts; it was particularly influential with regard to institutional reforms and water entitlements, which were explicitly mentioned MWSIP loan agreement. Groundwater-related legal reforms, including the 2009 Groundwater Act and the 2018 Draft Rules, should be viewed in a continuum with the general water sector reforms undertaken in the state since the early 2000s. The World Bank and others have hailed Maharashtra's water sector reforms and declared it a 'model' state for such reforms; however, the fact remains that these reforms have not led to any serious improvement in ground-level water governance (Argade and Narayanan, 2019).

Reallocations of water from agriculture and rural areas to meet the growing urban and industrial demand continue unabated, even without the approval of the MWRRA which is supposed to oversee such intersectoral reallocations. Between 2003 and 2010, 1983.43 million cubic metres (Mm^3) of water were diverted from 51 dams for non-irrigation purposes; of these diversions, 83% took place between 2005 and 2009, that is to say, after the MWRRA came into existence (Prayas Resources and Livelihoods Group, 2013). These reallocations were sanctioned by the state's High Power Committee, which consists of six state-level ministers. A 2011 amendment of the Act took away the MWRRA's mandate to allocate water for different sectors and granted this prerogative to state cabinet ministers[2]; at that point, the provision in the original Act to have public hearings on cases of water reallocation was also removed (GoM, 2018a; SOPPECOM, 2012).

More than 50% of Maharashtra is considered to be drought prone. Though the state has the highest number of large and medium-sized irrigation projects, only about 17% of its cropped area is under irrigation, compared to close to 40% in India as a whole. About 70% of this irrigated cropped area uses groundwater. One of the main reasons for the low percentage of area under irrigation is the sugarcane-centric water use in the state. Currently, the land under irrigated sugarcane is approximately 900,000 hectares (ha) and the water requirement for sugarcane is 25,000 m^3/ha (VSI, 2020); this amounts to an annual use of water for sugarcane of approximately 24 billion cubic metres (BCM), which is 42% of the estimated 56 BCM per year used by agriculture in the state (2030 Water Resources Group, 2015). Every narrative on drought in Maharashtra brings out this paradox of acute scarcity coexisting with islands of lush green sugarcane. These figures show that water sector reforms have not resulted in any significant

[2] The Council of Ministers is composed of two categories or ranks. The first and higher of these is that of cabinet ministers; at the second and lower rank are state ministers who, in most cases, work with cabinet ministers.

alignment of cropping patterns with local agro-climatic conditions as part of demand-side management, which was one of the important aims of the reforms (Joy and Samuel, 2019).

For the last three decades, the GoM and many NGOs have been giving increasing attention to soil and water conservation measures, mainly in the form of integrated watershed development programmes as part of an overall drought-proofing strategy. In 2014, the GoM introduced the Jalyukt Shivar Abhiyan (JSA) scheme, which involves constructing decentralised water bodies, installing new water harvesting structures and rejuvenating old ones, increasing groundwater availability, and creating awareness around water conservation through social mobilisation and participation. So far, 76.92 billion INR (about 1 billion USD) have been spent under the JSA. According to government officials, the JSA has been able to create a storage capacity of 680 Mm^3 in about 16,521 villages across 34 districts of Maharashtra and has brought 3.4 million ha under irrigation[4] (Bhadbhade et al., 2019). The JSA is clearly a supply-side augmentation programme with very little regulation of the use of the 'new' created/recharged water; for that reason – despite such a large investment and the claim of creating large amounts of water – in 2019 the GoM declared drought in 180 talukas, or subdistricts (nearly half of the state), which affected an estimated 60% of the farmers in Maharashtra. About 8.2 million farmers with about 8.6 million ha of land in 151 talukas were critically hit by the drought. In some cases, this resulted in farmers losing their crops and farms and accruing debt; in the worst instances, it ended in suicide (Jain, 2019).

It is in these efforts to recharge groundwater without emphasising demand management that the answer can be found as to whether groundwater law reforms enhance groundwater justice and overall sustainability or whether they, in fact, accentuate inequity and unsustainability.

While these reforms were taking place, Maharashtra also experienced interesting community-led initiatives in groundwater governance. In Nashik District, for example, is the Samaj Parivartan Kendra (SPK), which is the NGO that mobilised the farmers of the Waghad Irrigation Project to form water users associations (WUAs) to take over water management. The SPK forced the government to allow them to construct check dams (water harvesting structures) on streams in the command/service area of the irrigation project; technically, this was against prevailing irrigation laws. These check dams collected local rainfall, and some of the WUAs decided to return part of the water they received from the Waghad Irrigation Project to these check dams; this, in turn, recharged the wells and stabilised the local water regime. The Waghad WUA farmers rotated their irrigation, giving one rotation from the water they received from the Waghad project and the next from their wells, thus introducing conjunctive use of groundwater and surface water. Several WUAs went a step further and started charging private well owners a fee for the water they drew from their wells; this was justified on the grounds that the water in their wells was primarily from nearby check dams and also because well owners should be required to contribute to collective community efforts. This example of community practices pushes the boundaries of existing state-led law reforms.

The state has treated such practices as exceptions and thus has not engaged seriously with them while crafting groundwater law reforms. Certain sections of civil society have been using this type of 'successful' practice to argue against any state-led reforms in groundwater governance; this position is problematic since such successes would continue to remain isolated examples, while in the state as a whole, conditions of inequitable and unsustainable use would prevail. We therefore argue that groundwater law reforms need to co-evolve with village groundwater practices. As mentioned in the introduction, we argue in this article that if state-led reforms aim to bring in a progressive groundwater governance system that engages with concerns of justice and sustainability, there needs to be co-evolution.

[3] Most of these storage facilities are created by using large machinery to excavate streambeds or riverbeds and then allowing the excavated 'ditches' to fill with surface water flows following rain.

[4] This gives an irrigation norm of only 200 m^3/ha.

It must be noted that we approach and examine a community's groundwater practices from a critical point of view; we do not assume that all community-based rules of water sharing are just and democratic. A society such as prevails in India, with unequal social relations in terms of class, caste, patriarchy/gender and ethnicity, cannot have fully socially just, egalitarian, and non-exploitative relations; this is further accentuated in India's rural communities.[5]

In the following section we discuss in detail the theoretical underpinnings of three concepts, namely, common pool resource, groundwater justice, and sustainability. These three concepts are central to our analysis of groundwater-related law reforms in Maharashtra.

THEORETICAL CONSIDERATIONS: COMMON POOL RESOURCE, GROUNDWATER JUSTICE AND SUSTAINABILITY

Many scholars have categorised groundwater as a common pool resource (CPR), that is, as a type of good consisting of a natural resource system such as groundwater or an artificial resource system such as an irrigation system. The size or characteristics of such resource systems make it difficult, but not impossible, to exclude potential beneficiaries from their use (Ostrom, 1990). CPRs face problems of congestion and/or overuse because they are subtractable; moreover, they are limited by the fact that the state cannot guarantee that congestion and/or overuse will not happen. CPR theory is based on empirical research in a host of natural resources contexts – including groundwater – that have been conducted in numerous countries of the Global North as well as in several in the Global South. Ostrom (ibid) developed the theory of CPRs as a response to Hardin's (1968) 'tragedy of the commons', arguing that having a set of specific rules or design principles in place will prevent CPRs from experiencing a tragedy. CPR theory is important for our discussion as it highlights the need for specific rules/laws to avoid groundwater tragedies.

Taking inspiration from Swyngedouw and Heynen (2003), Schlosberg (2004), Fraser (2005), Sen (2009), and Joy et al. (2014), we conceptualise groundwater justice as distributional approaches that take into account how environmental and social change work to reallocate resources such as groundwater, land, income and power. Though the early conceptualisation of water justice was around struggles against water privatisation, it has evolved over time; besides the dimension of redistributive justice, that is, redistribution of resources, it now includes the dimension of cultural justice or 'recognition' of cultural identities, rights and practices, as well as procedural and representational justice, which is to say participation in decision-making.

Following ideas from Gupta and Onta (1997), sustainability of groundwater is conceptualised as using groundwater resources in such a way that groundwater's own recharge rate is respected and toxic substances do not exceed thresholds that are considered safe for humans, non-human species, and the overall environment. Despite the multiple relations between groundwater quantity and quality and the importance of understanding such connections in order to guarantee groundwater sustainability, often these two aspects are regulated by different laws and different institutions. Interactions between groundwater quantity and quality can be explained thus: pollution reduces the quantity of usable groundwater, while pumping groundwater can reduce its quality through the spreading of contaminant plumes and the intrusion of seawater.

In many places around the world, a grassroots-level narrative of sustainability is being used to fight water injustice; thus, at the level of practice, there is an explicit connection between these two ideas. Literature on natural resource governance suggests that a 'crisis' often provides the impetus for people to pursue, and find, common solutions and can lead to collective actions (Ostrom, 2010). Environmental degradation has been a strong motivator for people to fight against injustice (Agyeman, 2005; Schroeder

[5] Dr. Babasaheb Ambedkar, for example, in his book *Annihilation of Caste*, exhorted Dalits (or Scheduled Castes, India's erstwhile 'untouchables') to leave their villages and concentrate their numbers in the cities because he felt that Dalits would never get justice in the village.

et al., 2008) and to move towards sustainability of natural resources (Ostrom, 1990, 2007); it has particularly motivated action towards sustainability of surface and groundwater (Cuadrado-Quesada, 2018). We will use these two concepts of groundwater justice and sustainability in our attempt to critically examine groundwater law and community-based groundwater practices in Maharashtra.

THE 2009 GROUNDWATER ACT AND THE 2018 DRAFT RULES: HOW ARE THEY FOSTERING GROUNDWATER JUSTICE AND SUSTAINABILITY?

In this section, we critically analyse the 2009 Groundwater Act and the 2018 Draft Rules from the standpoint of groundwater justice and sustainability. According to some authors, the 2009 Groundwater Act[6] has been a positive first step towards improving governance and protection of groundwater in the state, though it is felt to have some major limitations (Kulkarni et al., 2015). Any 'good' law that hopes to regulate or guide the use of a CPR calls for robust institutional mechanisms with clearly stated roles and responsibilities; for example, it must include concerns related to diverse uses (domestic, farming and other livelihoods, industry, etc) and users.

In fact, one of the criticisms of the 2009 Groundwater Act has been that it, "seems to be centred around crops and agriculture groundwater use" (Kulkarni et al., 2015; Abraham and Joy, 2018). Though it is true that agriculture uses 70 to 75% of the groundwater, domestic uses (especially in cities) and industrial uses are also important and are on the increase; growing intersectoral contestations and conflicts are seen everywhere, including rural-peri-urban conflicts and domestic-agricultural-industrial conflicts. Intersectoral groundwater use and allocation therefore should be an essential part of the 2009 Groundwater Act and the 2018 Draft Rules (LPDSM, 2018). An integral part of groundwater justice is an allocation across sectors which takes into consideration the implications of such allocations for lives and livelihoods; however, the 2009 Groundwater Act and the 2018 Draft Rules do not engage with this issue.

The 2009 Groundwater Act primarily addresses sustainability of groundwater. It calls for: (i) registration of wells; (ii) identification of critical areas where regulation and stringent restrictions on use are required in order to protect and conserve the resource; (iii) preparation of integrated watershed and water management plans and of groundwater use and crop plans; and (iv) participatory mechanisms in the form of institutions at different scales such as the District Watershed Management Committee (DWMC) and the Watershed Water Resource Committee (WWRC).

The DWMC and the WWRC are the two main institutions through which the 2018 Draft Rules would be operationalised; this is specified in the 2009 Groundwater Act, which states that, "[t]he Watershed Water Resources Committee shall be responsible for the community participation, as per the guidelines of the District Authority, with the objective of equitable and sustainable development, protection, conservation, regulation and management of groundwater resources (…)" (2009 Groundwater Act, Chapter V, Section 33). The main issue with such an institutional arrangement is that the DWMC operates on administrative boundaries whereas the WWRC operates on hydrological boundaries, and hence there is an issue of mismatched boundaries; it would thus probably be better to align the WWRC with sub-basin/basin institutions (LPDSM, 2018). Despite the recognition of the importance of participation, scholars argue that the participation of people, especially women, is cursory; they point out the absence of clearly laid out processes that spell out how participation should take place (Abraham and Joy, 2018). The question of justice seems also to be centred on the issue of participation, without any provision for encouraging fairer distribution or access.

Another related issue that has come in for criticism is the size of the unit. A watershed, as defined by the Groundwater Surveys and Development Agency, may be a large area of about 30,000 to 50,000 ha. If people are to directly participate in groundwater development, use and regulation, then the scale must

[6] The Act received the assent of the President of India on 22 November 2013 and it was officially notified in the Maharashtra Government Gazette, Part IV, on 3 December 2013 (GoM, 2009).

be much smaller, such as, for example, a micro-watershed or an aquifer. With most of Maharashtra being covered with basaltic geology, aquifers are going to be, by and large, confined. This has implications for development, regulation and institutions, and reinforces the need for the primary unit of regulation to be an aquifer and/or a micro-watershed (LPDSM, 2018).

The 2018 Draft Rules are also criticised for the role they outline for farmers, who do not seem to have any power to decide cropping patterns. Section 14, which discusses the entire crop planning exercise, indicates a top-down approach; it thus raises the concern that it will remain an on-paper exercise by the Agriculture Department and will make little practical difference to water use on the ground. As per the provisions of the 2018 Draft Rules, the crop plan is prepared by the Agriculture Department (Sub-rule 4); it is then discussed with the gram panchayat and, after obtaining consent there, is placed before the *gram sabha*[7] for approval (Sub-rules 7 and 9). In the process, farmers find themselves at the receiving end of these decisions. Though it is mentioned in the 2018 Draft Rules that the Agriculture Department is supposed to consult with farmers in arriving at cropping patterns, the issue is whether farmers who lack prior technical empowerment pertaining to crop water budgeting will be able to understand, interpret, suggest changes, and then approve the plan. It may instead be better to first build on their experiential knowledge of groundwater as a common pool resource and equip them with the knowledge and skills to understand the geohydrology of the village, precipitation, crop water requirement, and available groundwater; they can then be involved in crop water budgeting exercises for preparing a crop-based plan (LPDSM, 2018). In light of these developments, there is a need to reconsider the 2009 Groundwater Act, while the 2018 Draft Rules should also reflect these developments.

The main issue from a groundwater justice point of view is whether groundwater will continue to be governed as a private property resource and whether water rights will continue to be linked with land rights; both of these would exclude many – particularly landless people – from groundwater access. The Supreme Court of India has applied the public trust doctrine to groundwater and has told the states that considering groundwater as a 'private property right' is inappropriate; the Supreme Court has also recognised the human right to water (Cullet, 2009). None of this, however, is echoed in the 2009 Groundwater Act.

The 2009 Groundwater Act's concern for sustainability can also potentially go against access and equity. For example, in Chapter II, Section 4, it says that, '[t]he State Authority, after receiving recommendations… based on scientific groundwater quality studies… is of the opinion that it is necessary or expedient in the public interest to regulate the extraction or the use of groundwater or both in any form in a watershed or aquifer area, shall declare such area to be a notified area… (Chapter II, Section 4, 2009 Groundwater Act).

This demonstrates how recent law reforms have tried to change groundwater access patterns to make them more sustainable; it seeks, for example, to discourage the practice of drilling private wells without notifying the state. Unfortunately, however, such regulations tend to undermine groundwater justice as these regulations can restrict the entry of new groundwater users, privileging older users whose water use is not monitored. Though such a provision can work against both large and small new users, it is likely to affect smaller farmers more, as larger farmers have the means to go to a different area and/or have already invested in wells. Larger farmers are very often using the bulk of the groundwater for the cultivation of water intensive crops such as sugarcane.

There are also certain provisions in the 2018 Draft Rules that may go against the interests of small and marginal/subsistence farmers. There is a provision, for example, for charging a levy/cess on the use of existing deep wells (those above 60 metres) in non-notified areas (Section/Clause 8 of the 2018 Draft Rules). Such a charge is all the more unjust when the wells in the irrigation command areas where water is plentiful are exempt from cess. Lokabhimukh Pani Dhoran Sangharsh Manch (LPDSM) has suggested

[7] The gram sabha is the general body of the gram panchayat; it includes all the members of the village who are above 18 years old. As mentioned earlier, the gram panchayat is the elected body which manages the affairs of the village.

that such a cess should be levied only on farmers raising water intensive crops or cash crops and should be related to the area under such crops; LPDSM further recommends that small and marginal farmers should be exempt from the cess (LPDSM, 2018).

The above discussions of the 2009 Groundwater Act and the 2018 Draft Rules show that groundwater law reforms in Maharashtra are primarily driven by a concern for sustainability of the resource, especially in areas where the groundwater table has been steadily declining. There is also a concern for participation, though it is constrained by many factors such as size of the unit, top-down approach to crop choices and crop water budgets, and absence of clearly laid out processes for participation or of budgets for participative processes. When it comes to access, distribution and equity, however, there are no proactive measures suggested in the 2009 Groundwater Act or the 2018 Draft Rules.

COMMUNITY PRACTICES: WHAT CAN STATE-LED GROUNDWATER LAW LEARN FROM HIVRE BAZAR, MAHARASHTRA, INDIA?

Hivre Bazar is located in the Nagar taluka of Ahmednagar district in Maharashtra, about 28 km from Ahmednagar town. The population of Hivre Bazar, as per the 2011 Census, was 1233, with 217 households (Directorate of Census Operations Maharashtra, 2011). Hivre Bazar is fairly homogenous in terms of caste, with the mid-level Maratha caste dominating in terms of both number of households and size of landholding. Scheduled Castes (SCs) – who are mostly landless – account for about 6.5% of the population, constituting 81 people in about 15 households (Directorate of Census Operations Maharashtra, 2011). The size of the operational holdings of farmers varies greatly, from less than a hectare to about 20 hectares (Menon et al., 2007). Most people in the village are dedicated to agriculture, with sorghum and millet as the main crops; they also cultivate onions, pulses, groundnuts, cucumbers, coriander, spinach and some fruit. Some of Hivre Bazar's residents have also joined the military or are employed as teachers (Sangameswaran, 2006; Menon et al., 2007).

The average annual rainfall in the district is 579 mm and the principal source of water for irrigation in Hivre Bazar is open wells. In the 1970s, Hivre Bazar was a typical semi-arid Indian village, where water was scarce and the women had to walk long distances to fetch drinking water. There was little agriculture, it being possible only in the rainy season and only for a limited range of crops (Sangameswaran, 2006). Hivre Bazar also suffered from economic and social deterioration, including illegal distilleries and alcoholism (Varghade, 2002).

As revealed in in-depth interviews with residents of Hivre Bazar, the village leadership was not effectively meeting the developmental needs of the village and most people were dissatisfied. By 1989, people in Hivre Bazar were very clear that they needed a significant change; at that point, they started to discuss and think about how to attain such a change. Villagers became enthusiastic about bringing back Popatrao Pawar, a young, charismatic, educated man who had left Hivre Bazar some years previous to pursue an engineering degree. That same year, Pawar was elected unopposed to lead the gram panchayat as sarpanch. He started working on uncontroversial issues such as repairs of the village temple and adding rooms to the then one-room public school. He then went on to consult with townspeople – mostly the elderly men in Hivre Bazar – about the most pressing problems.

As most people worked in agriculture, the main concerns were accessibility to water for drinking and irrigation, and low agricultural productivity (Sangameswaran, 2006). At that time, there were only two handpumps in the village and neither was functional; women thus had to walk 2 to 3 km to fetch water (Menon et al., 2007). Little by little, under the guidance of Pawar, the situation started to change; handpumps were repaired and the community started to have better access to water. In the early 1990s, Hivre Bazar applied for, and won, acceptance into the Adarsh Gaon Yojana (AGY) scheme. Literally meaning 'model village scheme', this state-led programme was meant to help improve the conditions in villages by replicating the experience of Ralegan Siddhi village, which was in the same district as Hivre Bazar and was well known for the social reforms and watershed developments brought in by Anna

Hazare, whose work inspired Pawar. To be eligible for the AGY scheme, a village must fulfil certain requirements; these include five rules or *panchasutri*: (1) restrictions on free grazing; (2) ban on tree felling; (3) ban on alcohol; (4) adoption of family planning; and (5) voluntary labour for developmental works and social activities.

This scheme represented an opportunity for Hivre Bazar to benefit from a government programme and at the same time shape the collective future of the village. Its most prominent impact has been an increase in biomass and in surface and groundwater availability and accessibility. This, in turn, has increased domestic water supply, irrigation, agricultural productivity, and animal husbandry. For the purpose of our discussion, two of these rules are particularly relevant: the restrictions on free grazing and the ban on tree felling. We will explain these two rules briefly in order to make clear what they involve and how they are intertwined with water justice and sustainability concerns.

Restrictions on free grazing: One of the first measures adopted in Hivre Bazar was the restriction on grazing. According to interviewees (Interviews No. 3, 4, 5, 6, 2017), free grazing can have negative impacts on vegetation and on the overall environment. When the programme started, grazing limitations were imposed on a rotational basis; this diverged from the total ban that had been enforced in some of the Maharashtra villages that had taken up watershed development projects, which had negatively impacted the livelihoods of the resource poor. When grass was abundant, people were allowed to pay a nominal fee to the *sarpanch* in order to take a headload of grass per day.

Ban on tree felling: Together with the restrictions on free grazing, when the programme started different types of trees were planted, especially on village forest land; these included babul, tamarind and bamboo. A resolution was passed in the gram sabha to ban cutting of trees or even branches of trees from the common lands in the village; villagers could, however, cut branches or trees from their own fields. The ban on tree felling was widely accepted and adopted in the village and has had a positive effect on water protection and overall sustainability (Interviews No. 3, 4, 5, 6, 2017). Notably, however, some authors have pointed out that the ban on tree cutting in Hivre Bazar has also had an adverse impact on social justice. It particularly affected landless households which did not have access to sources of fuel besides wood, and women who were thereby forced to spend more time and effort travelling longer distances to collect fuel (Menon et al., 2007; Sangameswaran, 2006); this was confirmed by all the interviewees in Hivre Bazar. The ban was also the beginning of reforestation efforts in the village, where extensive parts of the village land (common land) are now dedicated only to reforestation. As highlighted by one interviewee, "We realised that we needed to reforest those lands, and we started to notice the difference thanks to the reforestation programmes… Now we have water all year round, even in summer" (Interview No. 15, 2017).

When the project started in the early 1990s, in addition to the AGY rules Hivre Bazar also experimentally introduced two rules regarding groundwater, the first being a ban on borewells for agriculture, and the second – related to the first – being a ban on the cultivation of water intensive crops, especially sugarcane.[8] Over the past three decades, these rules have mainly been enforced through collective rule-making and social sanction, with villagers monitoring to make sure that no one is drilling borewells or growing water intensive crops. People in Hivre Bazar became convinced that the situation was improving; they also believed, however, that if they started using too much water, things would go back to the way they were. Interviewees suggested that they did not want to again experience the water shortages of the past and therefore were happy to use only shallow dug wells and to grow water-efficient crops (Interviews No. 15, 16, 17, 2017). The restriction on borewells has prevented over-exploitation of

[8] Ralegan Siddhi's programme of change, which predated that of Hivre Bazar, involved people taking the even more forward-looking step of banning private wells. In their place, they constructed larger common wells behind each of the check dams, with farmers in the vicinity sharing in the well water. This avoided the increase in the number of wells - and thus water pumped - that usually occurs post watershed development. This single change not only helped address sustainability and equity concerns; it also avoided dead capital investments in construction of wells, as most of them go dry in a few years.

groundwater resources and, at the same time, has broadened water accessibility. Unlike in the 2009 Groundwater Act and the 2018 Draft Rules, here the restriction was not on new entrants, as everybody was free to dig shallow wells. The ban was only on borewells that were tapping water from deeper aquifers, thus going beyond the annual flow or recharge and extracting water from the ancient stocks

We cannot, however, ignore the fact that the number of borewells has increased in the past years. Menon et al. (2007) report that the 140-odd households have about 340 borewells[9] with attached pumping devices; our fieldwork confirmed that the number of borewells with pumping devices continues to increase.

In Hivre Bazar, these two rules have helped to ensure that groundwater use is both sustainable and more equitable. More people now share the water, instead of the main water users being a few sugarcane farmers, as was previously the case; indeed, the sugarcane farmers have now shifted to more remunerative vegetable cultivation and dairying. As mentioned by one participant, "In Hivre Bazar, water-intensive crops are banned…, we do not have sugarcane crops…, we changed several hectares from sugarcane to more water-efficient crops. This led to better water accessibility, increased agricultural diversity production and a number of other benefits" (Interview No. 5, 2017). With an improvement in the local water regime, the farmers could provide light but frequent irrigation, which is a requirement for vegetable crops;[10] this measure also helped in overcoming continuous years of drought. Watershed development, unsurprisingly, performs better in years with average or above-average rainfall; in the case of several years of drought, water supplies – even for domestic use – often must be supplemented with tanker water. Since the launch of the programme in Hivre Bazar, however, there has been no need for such supplementation. As expressed by an interviewee, "We can see water tankers going out from Hivre Bazar to provide water to nearby villages" (Interview No. 15, 2017).

DISCUSSION: ADDRESSING GROUNDWATER JUSTICE AND SUSTAINABILITY CONCERNS IN HIVRE BAZAR, MAHARASHTRA, INDIA

In cases of increasingly serious inequity, injustice and environmental degradation, such as those experienced in Hivre Bazar in the 1980s, people are pushed to make changes. Notably, change motivated by social and environmental crises does not necessarily lead unidirectionally to equitable water access, water justice, or sustainable use; it can give rise to intense competition for scarce resources or can lead to quick-fix solutions that may be unsustainable and inequitable in the long run (as was, for example, the JSA scheme discussed in Section 2). However, it can also lead a community to push for groundwater justice and sustainability.

Core findings regarding groundwater justice and sustainability

Our empirical research, as well as the literature (albeit limited) on Hivre Bazar, shows that there are four core factors that have helped the villagers of Hivre Bazar to address some of the existing social and environmental problems and to move increasingly towards groundwater justice and sustainability. The citizens of Hivre Bazar were able to: (1) acknowledge the crisis and display a willingness to engage with it; (2) create a rule-bound community groundwater resource; (3) exhibit leadership and generate a feeling of community; and (4) utilise awareness, information and knowledge.

Acknowledging the crisis and displaying a willingness to engage with it

In the 1970s, Hivre Bazar villagers who wanted change were primarily motivated by their deplorable environmental, social and economic situation. The community's youth realised that they needed to go

[9] These households correspond to Maratha caste with medium/large landholding (10 to 20 hectares).

[10] Sugarcane can survive longer gaps between two irrigation rotations, which is one reason why farmers tend to go for sugarcane.

beyond business as usual and do something very drastic to overcome the crisis; they therefore decided to appeal to Popatrao Pawar to return to the village and take up the reins of leadership. The villagers agreed to Pawar's condition that his coming back to the village and becoming the sarpanch would be contingent on his being elected unopposed. One important reason for the change being possible was Hivre Bazar's fairly homogenous community in terms of caste, with the Maratha caste being the dominant one. There had been clan rivalries and tensions within the Maratha community, however, interviewees commented that with Pawar's arrival on the scene people did overcome some of these fault lines for the 'greater common good' of the community.

Local context is fundamental to understanding what and how rules related to groundwater and its use are made and implemented in a village; this includes particularities regarding social, economic, environmental, cultural and religious practices (Sangameswaran, 2006). Economic activities such as agriculture, for example, affect how groundwater is used in a given location. Moving from groundwater intensive crops to those that use less groundwater can avoid the over-exploitation that occurs when groundwater is being extracted faster than it can recharge. Increased groundwater accessibility through groundwater saving can have a long-term effect; moreover, preventing over-exploitation means that more unused, recharged groundwater is accessible and thus available to a greater number of people. As demonstrated by the findings of this research, environmental crises manifested in the form of groundwater and livelihood insecurity have been strong motivators for people to change their relationship to groundwater resources (Lopez-Gunn, 2003; Cuadrado-Quesada, 2018).

Creating a rule-bound community groundwater resource

In the case of watershed development, public investment and community labour are required to improve surface storage and increase groundwater. These both were made available in Hivre Bazar through a collective effort. The newly created water resource thus warrants being called a community water resource, despite the groundwater component of the water resource operating primarily under a private property regime.

As the water resource in Hivre Bazar was newly created (producing 'new' water), and as its uses and associated rights had not yet been established, people were more willing to craft rules that tilted towards equity and sustainability. This may have been one of the reasons why groundwater resource rules were generated from the bottom up in Hivre Bazar. Such rules can, in fact, emanate from different sources: from legislative bodies in the form of state-led laws; from government departmental programmes and schemes in the form of stipulations to avail of the schemes; from international cooperation and/or funding programmes/projects in the form of imposed conditions; or from community-based organisations or panchayats in the form of social norms or customary laws. Some scholars have defined this as legal pluralism (von Benda-Beckmann et al., 1997; Bavenick and Gupta, 2014). The social norms and customary laws are often not written down, but rather are internalised and implemented by the community. Notably, these different rules, norms, laws and regulations often ignore each other and are sometimes even contradictory, though they can also, of course, be complementary.

Exhibiting leadership and generating a feeling of community

Our Hivre Bazar interviewees included Popatrao Pawar, the sarpanch who returned from the city, highly educated, in 1989 (as recounted in Section 5). From the time of his return to the village, Pawar endeared himself to the community. He did not identify himself with any of the Maratha clans or factions even though he was a 'Pawar', and his cricketing abilities made him very popular with the youth of the village. As sarpanch, he organised the village to address some of the most commonly felt problems, especially issues related to education and the village school, and the alcoholism that was quite rampant in the village. These initiatives helped the villagers to gradually evolve into a 'community' and reinforced his image as a person who could rise above factionalism. He then turned his attention to drought and the

lack of access to water. Both the evolution of Hivre Bazar into a community and the image of Popatrao Pawar as progressive and proactive were important components of the village's bid for acceptance into the AGY scheme (as discussed in Section 5), which brought government funding and support to Hivre Bazar (Interview, Popatrao Pawar, No. 10, 2017).

Critically, the village – with the involvement of Pawar – came to understand the environmental vulnerability and the finite nature of surface and groundwater resources. They also gradually learned the particularities of groundwater, including its slow recharge rate. Pawar bolstered his support in the gram sabha and continues to take all his ideas there, where they are debated and discussed among adults in the village who are older than 18. According to all local interviewees, these gram sabha meetings are well attended – even though most women remain largely silent during the meetings – and discussion includes the topics of water accessibility and distribution, sustainability, cropping patterns and agronomical practices, as well as protection of, and access to, common lands. The findings illustrate the role that leaders can play when there are problems that need to be addressed. Leaders such as Popatrao Pawar are often also motivated by a sense of community (Lele, 2004; Cuadrado-Quesada and Gupta, 2019); in fact, it is a case of the close co-evolution of a community and its charismatic leader. Today, Hivre Bazar has become a 'sellable' brand name in India with Popatrao Pawar seen as its main architect.

Utilising awareness, information and knowledge

It is difficult to overstate the importance of awareness and its role in changing local mindsets to achieve groundwater justice and sustainability. Failure to change how groundwater resources are extracted and the way in which they are affected by other processes will make sustainability impossible; awareness about access, reallocation and redistribution are also pivotal in addressing existing social inequities. While awareness is vital in promoting information and knowledge about the behaviour of groundwater, there is a generally low level of public awareness about this (Joy and Paranjape, 2005; Schlager, 2007; Wijnen et al., 2012; Cuadrado-Quesada, 2018). As the case study of Hivre Bazar shows, often groundwater users do not understand how it functions and the threats it faces; however, important efforts have been made to tackle this issue (Interviews No. 10, 15, 16, 17, 2017). As the experience of Hivre Bazar furthermore illustrates, raising awareness is not only about information and knowledge with regard to how the resource works or functions; it is also about addressing equity concerns such as more adequate reallocation and redistribution of groundwater. In this regard, the story of Hivre Bazar brings out certain limitations. The village did not, for example, problematise the linkage between groundwater rights and land rights. The landless, particularly, are automatically excluded from groundwater access because it is mediated by land ownership; size of landholding, furthermore, is often an important factor in deciding how much groundwater one gets (Interviews No. 15, 16, 17, 2017).

Collection of local meteorological data was linked to awareness, information and knowledge; this includes, for example, measuring rainfall and monitoring water, especially groundwater. The data was used to craft groundwater use rules as per availability, taking the form of groundwater budgets and audits. The gram sabha launched such initiatives in 2004 and these activities have contributed to the community's comprehension of how groundwater levels work, how much groundwater there is, how best to distribute it, and how much groundwater is left for the environment. As a participant commented, "We think the monitoring and annual groundwater audit has contributed to a more equitable and sustainable management of groundwater resources (…). It has also contributed to greater agricultural productivity" (Interview No. 24, 2017).

Awareness, information and knowledge also translated into the development of other rules around demand-side management. In average rainfall years, for example, people agreed to certain types of groundwater use in terms of how much area they should have under irrigation in winter and in summer; they further agreed on the application of curbs on irrigation that should be imposed if there is below-average rainfall in summer or winter (Menon et al., 2007). Awareness, information, and knowledge were

also linked to: reforestation; a ban on water intensive crops; and a ban on irrigation borewells (as discussed in Section 5).

The need for co-evolution between community-led groundwater practices and state-led groundwater law

The previous discussion of Hivre Bazar illustrates how communities have been developing certain practical – if perhaps not sophisticated or theory-based – rules of thumb; these include rules related to the use of groundwater and to matching groundwater use irrigation to rainfall, which differ from state-led groundwater law. The communities' groundwater rules may not be scientifically evolved or based on sophisticated modelling; they can, however, harness the power of social 'consensus' or acceptability which can take the groundwater governance agenda forward. The Hivre Bazar story also shows that instead of waiting for the best science/knowledge/models, groundwater rules can be crafted to make groundwater use and access more broad-based and sustainable, with the potential to develop further in light of new data, experience, methods and knowledge. This brings us to the question of how the state engages with community practices while crafting law. Typically, governments and government agencies treat such practices as 'exceptions', possibly warranting some space in policy/legal/regulatory documents as 'box items' or as 'best practices'; however, they are not seen as forming part of groundwater law. In other words, there is no space in groundwater law for communities to progressively bring in rules that promote greater equity, justice and sustainability.

We use the concept of co-evolution to denote a different process, one that sets it apart from the usual top-down, expert- and science-centric approach to law-making. Co-evolution in the form of collaborative law-making is becoming increasingly significant for environmental/water governance (Joy et al., 2008). It embodies a more participatory, collaborative process of law-making in which actors bring to the table their lived experiences, everyday practices, rules of thumb, information, awareness, interests and knowledge. This article looks at groundwater law in Maharashtra from a groundwater justice and sustainability perspective. In that context, co-evolution of law and practice means that law-making processes must consciously engage with, and incorporate, the proactive steps taken by communities to manage and regulate groundwater use; law-making processes must include community-level measures to augment groundwater supply, manage demand, create equitable access, and promote and improve its sustainable use. In turn, this also means that ground-level practices should be refined or modified in light of new law concerns and imperatives which may emanate from scales beyond the immediate micro-watershed or village level. In Hivre Bazar, in the early 1990s when the AGY programme was launched, the entire focus was on the village, thus no attention was paid to the indiscriminate groundwater extraction by residents of the village immediately downstream; better awareness of the wider context can raise sustainability issues to, for example, the sub-basin level (Menon et al., 2007). The mutually influencing relationships between the sub-basin and basin levels are important as groundwater is both a local and a non-local resource. As micro-watershed development experience in India shows, local actions in any part of the basin can have basin-wide impacts (Joy and Paranjape, 2004). To explain the concept of co-evolution of law and practice, there have been attempts to draw a parallel with the "concept of 'co-evolution' from biology, where it refers to change in one object triggered by change in a related object" (Yip et al., 2008, as cited in Underdal, 2013).

CONCLUSION

This paper examined whether and how groundwater law reforms in Maharashtra, India, are addressing groundwater justice and sustainability concerns and how can they more robustly include justice and sustainability. The content analysis showed that there has been promotion of groundwater law mainly around sustainability and that the same is true in practice at the local level; this was illustrated by the case study of Hivre Bazar, where it has been easier to foster sustainability than to directly approach

questions of groundwater justice. Even though this research examined only the village of Hivre Bazar, the findings suggest that the situation there is generalisable to many other villages in rural India where the main rules of thumb for allocating, distributing and governing groundwater resources emerge at the community level.

This article makes a threefold contribution. First, it shows that the 2009 Groundwater Act and 2018 Draft Rules are primarily driven by concern for groundwater sustainability – especially in areas where the groundwater table is steadily declining – but that when it comes to groundwater justice, neither the 2009 Groundwater Act nor the 2018 Draft Rules contain proactive measures. Second, it identifies core factors present at the local level that were fundamental to facilitating groundwater sustainability and, to a lesser extent, groundwater justice; these core factors were the village's ability to: (1) acknowledge that there was a crisis and display a willingness to engage with it; (2) create a rule-bound community groundwater resource; (3) demonstrate leadership and generate the feeling of community; and (4) utilise awareness, information and knowledge. Third, the paper evidences the importance of co-evolution between the community groundwater practices and state-level groundwater law.

The discussion of the village of Hivre Bazar clearly brings out both the strengths and limitations of community groundwater practices and how they affect groundwater justice and sustainability. It points to the need for state-led law to provide space for community groundwater practices and locally crafted rules and, at the same time, set the boundaries on such law-making; in other words, rather than either/or, it is a case of state-led groundwater law co-evolving with local groundwater practices to further the cause of groundwater justice and sustainability. Since the 2018 Draft Rules have not yet been legally notified, there is probably still an opportunity to modify them in light of critical insights from micro, contextualised experiences such as Hivre Bazar, such that they can more effectively further the cause of groundwater justice and sustainability.

In conclusion, we need to go beyond a polarised, either/or position. State-led groundwater law needs to be informed by – and internalise – grassroots practices, local rules of thumb, and community-level initiatives and innovations. The role of national/state-led law reforms is to set boundaries on law-making for groundwater governance which allow sufficient space and flexibility for local communities to evolve practices (Zwarteveen et al., 2017), rules of thumb, and norms which take forward the agenda of groundwater justice in terms of sustainability, redistributive justice, local participation, and respectful recognition of local contexts.

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ANNEX: INTERVIEWS

Interview No 3. 2017. Interview with local resident of Hivre Bazar. 10 October.

Interview No 4. 2017. Interview with local resident of Hivre Bazar. 10 October.

Interview No 5. 2017. Interview with local resident of Hivre Bazar. 10 October.

Interview No 6. 2017. Interview with local resident of Hivre Bazar. 10 October.

Interview No 10.2017. Interview with Popatrao Pawar. 11 October.

Interview No 15. 2017. Interview with local resident of Hivre Bazar. 12 October.

Interview No 16.2017. Interview with local resident of Hivre Bazar. 12 October.

Interview No 17. 2017. Interview with local resident of Hivre Bazar. 12 October

Interview No 24. 2017. Interview with local resident no. 24 of Hivre Bazar. 14 October.