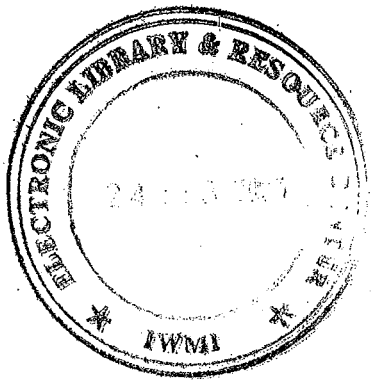
AGRARIAN TRANSFORMATION AMONG TRIBALS

A Synthesis of Six Case Studies Prepared under the Central India Initiative of NMSWDF, IWMI-Tata and PRADAN



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Section I: Introduction

In the sub-tropical monsoon based ecology, farmers can normally cultivate one rain-fed crop a year fraught with high risk as monsoon rains are quite variable. Assured irrigation enables farmers to obtain at least two crops, effectively doubling the land holding, and control over water increases crop productivity as conditions conducive for plant growth can be created. With risk significantly lowered, farmers can venture into more intensive and productive technologies and management. Increasing irrigation has been a state priority through all the years of planned development. However, with aggregate food production as the objective, the focus has been on the so called high potential regions amenable to medium and large river valley schemes mainly serving the plains and the deltas.

Significant opportunities to develop irrigation from small perennial streams exist all over the hilly and undulating region stretching across about 18° to 25° latitude, especially in the wetter eastern parts covering south Bihar, non-coastal Orissa, eastern Madhya Pradesh and eastern Maharashtra. The probability of perennial flow in streams is higher here due to higher rainfall and reasonable forest cover. This contiguous region across several States is one of the largest concentrations of poor people in India now and is also home to some 50 odd million tribal people, 70% of the tribal population in the country. More than 90% of the tribal population of the region is rural, directly or indirectly dependent upon agriculture. In spite of the fact that most of them hold land, agricultural practices are quite primitive and production is low. Subsistence farming coupled with increase in population has taken them to the lowest level of destitution.

A review of the agro-climatic sub-regions here portrays more or less similar characteristics. Population density is low, with a high percentage being rural and tribal. Literacy rates are low, especially among women. Land and water productivity is also far below potential despite reasonably high rainfall of 1,000 mm on an average. Agriculture is characterized by low use of modern technology, and is primarily rain-fed with minimal groundwater utilization. Overall, there is a very high incidence of poverty notwithstanding the abundance of natural resources and high potential for agricultural growth.

As identified by specialists, factors constraining the growth of agriculture here are fairly common. Large-scale deforestation and poor husbandry have resulted in degradation of land. Cropping intensity is low, primarily due to inadequate water harvesting and poor development of irrigation infrastructure. A large proportion of cultivated area comes under rain-fed agriculture, and is subject to the vagaries of the monsoons and frequent natural calamities. As a result, most crops cultivated are low value crops. Extension of suitable technology, particularly for water resource development and agricultural production, does not match the rich potential of water resources. A high proportion of cattle here is of inferior quality, and there is an acute shortage of fodder in spite of abundance of wastelands. Equally critical is that the capacities of the predominantly tribal population to adopt improved technologies remain latent.

Rapid agriculture development through improvement of land and water resource management is widely understood as a significant intervention in this region, to meaningfully fight poverty. However, efforts by both government and NGOs fall far short of expectations, and certainly do not match investments. While a service delivery approach and the absence of location specific plans are major constraints in government programmes, participatory approaches followed by NGOs have also largely failed to attract the tribal community to settle for sustainable agricultural practices. The insouciant attitude and lack of farsightedness among tribal community often are recognised as the reason for this. At the same time, sporadic cases of success highlight the importance of appropriate technologies and processes to bring about desired changes.

Although the spread of such cases, in terms of geographical coverage, is still small, their technologies, processes and effects offer important opportunities to learn practical lessons. These can contribute significantly to policy dialogue and even programme formulation and management for this region, to sharpen understanding of what goes into the making of an effective programme to intervene in using irrigated agriculture for livelihood promotion among tribal poor. With the government hard-pressed with targets for increasing production to meet the growing needs of our alarmingly increasing population, it is certainly going to have to channelise investments to this region. This is further justified as other regions in India have almost reached their potential of agricultural production, and the gap between present production and potential is the highest here. Such investment decisions would be enriched with lessons from the field.

IWMI-Tata Water Policy Program, NM Sadguru Water and Development Foundation and Professional Assistance for Development Action (PRADAN) started a collaborative research project to explore fruitful methods of harnessing the unexploited water resources for the benefit of the tribal population living in the Central Indian regions of Rajasthan, Gujarat, Madhya Pradesh, Chattisgarh, Jharkhand and Orissa. This initiative aims to create an opportunity to learn from and share with others ideas about what works, what does not work, and what are the ways forward. What makes the promotion of irrigation-based sustainable livelihoods among tribal poor more effective is, thus, the fundamental research question. In the first phase of this initiative, six case studies were undertaken. This synthesis of these case studies attempts at drawing lessons from these case studies.

The six case studies taken up for this synthesis are:

Table 1: Phase I Case Studies

Code	Author (s)	Title
CS 1	Harmeet Saini and Rakesh Pandey	A Study of Land and Water Resources Development Programme promoted by N M Sadguru Water and Development Foundation in the tribal regions of Gujarat and Rajasthan
CS 2	Harnath Jagawat and Kanhaiya Choudhury	A Study of Government Installed Lift Irrigation Schemes in District Jhabua, MP
CS 3	Sachin Mardikar	Irrigation Intervention with tribals in Wardha District, Maharashtra
CS 4	SK Mahapatra and Vaibhav Bhamoriya	Where is the Demand? A study of PRADAN's Irrigated Agriculture Program
CS 5	Aditi Mukherji, Shilp Verma and Prabhat Rath	Participatory Irrigation Management in AKRSP (I) Supported Canal Irrigation Systems in South Gujarat-Impact on Tribal Households
CS 6	Shilp Verma and Manas Satpathy	Irrigation Development For Tribal Farmers in Surat Distrtict of Gujarat

This attempt at synthesizing these six case studies is aimed at refining the research hypotheses of the Central India Initiative and to help the next step of research by explicating the nature of investigation. Towards that end it serves primarily as a basis of discussion.

Section II: Conceptual Framework[1]

Preamble

Central Indian regions that form the focus of the Central India Initiative share some common features. They may be summed up as:

1. Presence of a fair proportion of tribals (10% and above) in the population,
2. An undulating terrain,
3. Significant precipitation and gross under-utilisation of the available water there from
4. Generally single season and rain-fed cropping and
5. Acute poverty, indebtedness and forced migration by tribals.

Yet the regions are not entirely homogeneous. For instance,

1. Rainfall is much higher and biomass much denser in Eastern plateau and hills as well as Central Indian plateau and hills region. Tribals here have greater livelihood opportunities from the natural resources such as forests.
2. Length of water flow in streams is much more in the Eastern and Central hills and plateau regions than in Western MP, Gujarat or Rajasthan. Soils and underlying rock formations are different too.
3. Tribal population in the various regions appears to be in different stages of socio-economic development. Chowdharies of Surat, though tribals closely resemble settled agriculturists. Pardhis of Central India and some gond tribes in Bastar are essentially hunter-gatherers.
4. Alternate economic opportunities are of a different kind in the different regions. Naturally, what they learn and can bring back for self-improvement is different. Bhil tribals in Gujarat migrate after monsoon for both non-farm occupations as well for farm wage labour on farms of Patels in Central Gujarat. Tribals in Khandesh migrate as sugar-cane harvesters as well as industrial labourers. Kolams of Vidarbha basically do not migrate at all but seek livelihoods in mahua and tendu leaf collection. Jharkhand tribals migrate to work on brick kilns among other tasks.
5. Infrastructure development is of a varying degree also. Electricity supply is easier even for tribals in Gujarat, Khandesh, Vidarbha and Chattisgarh but is quite difficult for those in Jharkhand.
6. What the tribals can do with water if irrigation is provided to them also differs. Wheat yields in the eastern regions are much poorer due to their agro-climatic conditions etc. Markets for vegetable crops are more easily accessible to tribals in South Gujarat than other tribals.

One thing that appears quite common is that irrigation and cultivation of a second crop introduces big changes in the current life pattern of tribals. While irrigation permits second crop

[1] ***Qualifying Comment:*** *Many statements in this synthesis, particularly those in the conceptual framework are based on our own observations and impressions rather than documented evidence. We welcome corrections to them, particularly from practitioners who have obviously far more direct knowledge of the people and the area where the case studies were done. Later in the synthesis, we have suggested a conceptual framework. This has come after the case studies were nearly completed as such adequate information on each aspect of the conceptual framework can not be available in each case study. We have recorded inferences/statements from the various case studies based on our understanding, interpretation or inferences, particularly when direct data connected with an aspect is not found in the relevant case study. Here too, corrections are welcome. Should case study writers believe that some additions and changes in the case study documents are called for in the light of the conceptual framework for synthesis, we encourage them to undertake the task.*

and hence enhanced income and food security at home, it also requires them to largely forgo the income and possibly the security or support systems they have created in the current pattern of life. The shift from a "single rain fed crop followed by migration for work" pattern of life to settled agriculture in one location is unlikely to occur for all the tribals precisely in the same manner and through the same route.

Conceptualising Success

What Works and What Does Not: What do we mean by what works? What is indeed the meaning of success and failure in our context? For some, mere ability to provide water to farmers is a good enough definition of success. For others, the ability of the users' group to manage its own affairs and in particular the scheme meant for them may be more important. Still others may insist that success comprises of using mainstream government programs and funds to bring about development.

We believe that an irrigation intervention to be called successful or "working" must be able to deliver water to all the people included in its command and on a sustainable basis. Success and sustainability must be looked at multiple levels:

1. Whether the intervention in fact can deliver water on the farms is the zeroeth order question. Any irrigation intervention that can not deliver water to all the people (do we dilute this requirement?) in the defined command, for whatever reasons has failed the most basic test.

2. Whether the tribal perceives and actually gets a viable livelihood option by using water from the scheme is the first order question. In other words, water may reach the tribals' farms but they may not use it. This is also indicative of a failure.

3. Whether tribals' use of water for growing a second crop can continue to happen in a medium term and largely with community based management is the second order question. This would subsume both the durability of the hardware, soundness of the local management system as well as social sustainability of the local governance system.

4. Whether the arrival of water sets the family or village economy on an upward ratchet of "higher-production-savings-newer choices-investment-even higher income" is the third order question.

5. Whether the group becomes capable of managing all the forward and backward linkages and is also able to replace worn out assets is the final question.

Some schemes may achieve success on the lower order questions; some may achieve none at all. Few will attain success on all these questions and they need to be understood fully (for the context, for choices made, for organisation mechanisms set in motion and for water plus interventions launched).

Framework for Synthesis

From the narration of each of the case studies, we attempt to isolate facets of reality mentioned below. These are the facets on which we compare across the studies and draw conclusions for the project. We believe that we will obtain a toe hold on the phenomenon if all these factors were understood well.

Table 2: Framework for Synthesis

A. Context Related Factors: Topography, Soil and Formation	1. Agro-climatic conditions 2. Proximity to product markets, transport and infra-structure 3. Alternate employment opportunities 4. Socio ecology (exploitation, usury, feudalism, near serfdom etc.) 5. Current state of over all agricultural development in region: Do the tribals have role models to emulate in their locale?
Context Related Factors: Social Attributes	1. Preferred life style 2. How benevolent is the jungle still 3. Stage of skill development: Where are the tribal in the spectrum of life mode: hunter-gatherers, nomadic pastoralists, part time agriculturists, migrants on farm tasks, non-farm migrants, or settled agriculturists?
B. Technical and Resource Related Factors: Under what conditions of resource endowment does the scheme operate?	1. Annual precipitation, pattern of precipitation (whether bimodal or unimodal), time-length of flows in streams 2. Ground-water regimes and level of development 3. Electricity and diesel supply situation 4. Topography: How feasible are small check dams and anicuts? What kind of structures are the best and what capital costs are involved. 5. Existing state of water resource development: have all "best" sites been taken up already by non-tribals?
C. Choice of Schemes: Design, Operation and Organisation Issues	1. Unit of beneficiaries: individual/small-groups/large groups 2. Robustness 3. Extent of demystification and dependability of technical support 4. Locus of control and extent of control on key variables of supply schedules, pricing and enforcement of sanctions and prohibitions
D. Financial Matters: The specific manner in which hardware costs and operating expenses of the scheme are managed.	1. Source of funds for capital costs 2. Extent of contribution of tribals if any 3. Realism in pricing of irrigation 4. Creation of maintenance fund 5. Depreciation reserve 6. Collection mechanisms
E. Water Plus: Have there been interventions from the agency managing the initiative to also provide inputs in fields other than management of irrigation?	1. Extension, credit, supply or marketing? 2. Interventions in choice/supply of seeds, fertilisers etc 3. Interventions in credit 4. Interventions in marketing if any 5. Interventions in water application techniques
F. Governance: How is the intervention being managed? Who manages it?	1. Extent of control by users 2. Pace of passing on the control to users 3. Intensity of efforts on institution building within user organisations 4. Rule making processes 5. Clarity in rules regarding water use 6. Conflict resolution mechanisms 7. Involvement of traditional system of tribal leadership 8. Networking with other CBOs

(Please note that PIM is in a class by itself. The intervention begins when the hardware is created by some one else. As such and many things in sub-sections B, C and D above can not be directly applied to it)

Box 1: Development Categories

These are categories based on observations of manifest behaviour of a "typical" group or the community with whom work on irrigation initiative has been done. Case writers themselves were asked to place the communities they studied into these categories. The categorisation does reflect the subjective judgement of the case writers and/or of the authors of this synthesis paper.

Category 1: Tribals live still almost like children of nature, depending upon hunting, gathering and very rudimentary farming. No specialised occupation or skills. Livelihood opportunities from the jungle preferred and are available. Completely non-acquisitive. Can not plan for future but rather live by the moment. Little migration to non-tribal areas. High xenophobia.

Category 2: Tribals have started taking to farming more seriously, with several examples of tribals using intensive agricultural techniques. Forests are viewed as livelihood opportunity only in terms of collection of firewood for sale, legitimate and organised collection of herbs, honey, mahua or tendu or sly collection of bamboo etc. Greater degree of acceptance of concepts of forward planning. Migration still avoided by a majority and outsiders are looked at with suspicion.

Category 3: Tribals have become regular farmers but are constrained by poor natural resource characteristics and insufficient investible capital. Can identify the causes of their own poverty but are unable to act because of cyclical nature of cash deficits and indebtedness. Increasing migration, possibly for several non-farm occupations as well. Low on risk taking and not free of xenophobia.

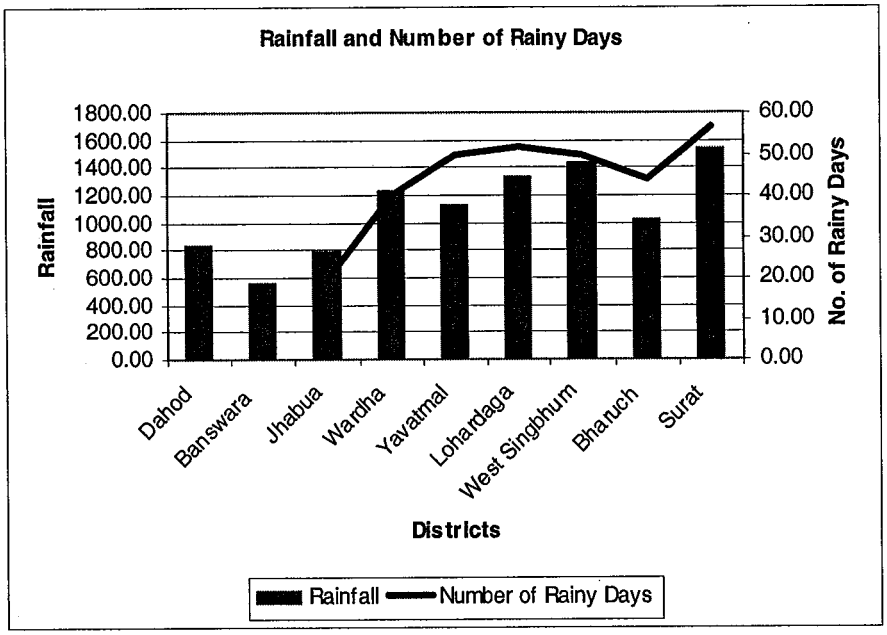
Category 4: Tribals are regular farmers and have acquired the necessary skill and expertise in intensive agriculture comparable with main-land farmers. Migration is only of a forced nature. Natural resources are unable to provide livelihoods of the type desired by tribal people. Awareness level, risk taking and enterprise levels are fairly high.

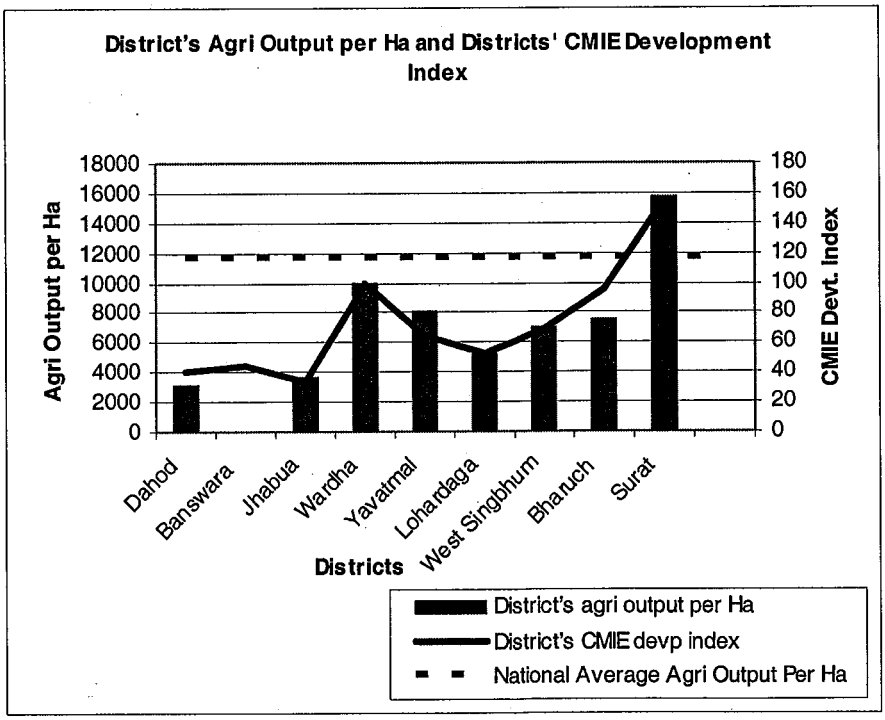
Section III: Comparative Data Collation from Case Studies

Data on various parameters relevant for understanding the case circumstances under which the initiatives were undertaken, the specific details of technical and managerial systems adopted, the social processes followed and observed and the results achieved are summarised schematically in Annexures 1 through 8 attached to this paper at the end. The Annexures follow the codes stated in Table 1.

Summary Observations from Individual Cases

Annexure 1 - Physical and Agro-Climatic Features: The rainfall pattern is unimodal across the cases but the number of days and the average precipitation varies with the lowest in CS1 (Sadguru Case) and the highest in CS6 (GWRDC Case). Broadly, as we move towards eastern India, the average rainfall increases, the only exception to this being the high rainfall zone on the western boundaries of the Satpura ranges (Surat, Bharuch etc). The soil type varies with elevation even within the same district from black Alluvium soil in the plains to sandy and eroded top soils in the slopes. The main kharif crops include maize, paddy, tuhar and cotton. Another crop which is very popular in the Vidharba region is Sorghum (Jowar). The length of water flow in streams is much more in the Eastern and Central hills and plateau regions than in Western MP, Gujarat or Rajasthan. The forest cover also thickens as we move towards the east from completely barren in the Sadguru areas of Dahod and Banswara to as much as 33% in West Singbhum. The socio-ecology of the entire tribal belt seems to be heavily dominated by the non-tribals. Tribals themselves are at different stages of socio-economic development and while largely tribal societies have been known to be egalitarian, the authors found a distinct class

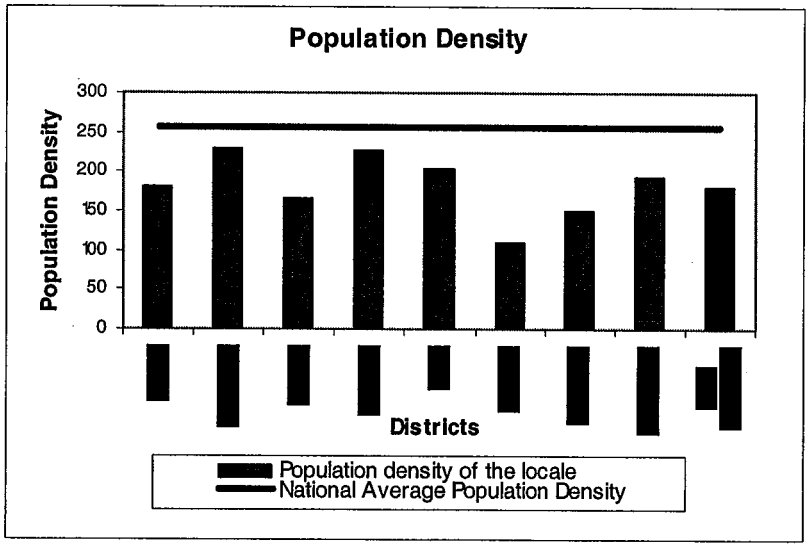




hierarchy amongst the tribals in Surat – Dhodia Patels, Chowdharies and Gamits, in that order. Agricultural output per Ha[2] also shows great degree of variation, being very high in South-eastern Gujarat and the Central Hills and plateau and lowest in Dahod and Banswara. CMIE's ranking of districts on an index of development[3] also shows a similar trend with Surat and Wardha districts standing out.

Annexure 2 - Infrastructure Development and Economic Opportunities: In terms of infrastructure development, Gujarat is way ahead of all others in terms of road network and access to and availability of electricity and diesel. Tribals have greater access to alternative livelihood systems in the eastern state of Jharkhand as also in the central hills and plateau of Wardha and Yavatmal districts. In all other areas, the dependence on forests as a means of livelihoods is either non-existent or insignificant.

Annexure 3 - Social Attributes: The tribal population in the various regions appears to be in different stages of socio-economic development. Chowdharies of Surat, though tribals closely resemble settled agriculturists. In the six case studies under review, the level of development of tribals seems to be lower in Jharkhand and in Vidarbha and the highest in Surat-Bharuch. Tribals in the least developed category are seen to be only in West Singhbhum and in Yavatmal Districts. In eastern India, the Oraon tribes are the ones most aware of their surroundings and are in touch with the mainstream. Among the other tribes, there are differences within the same tribe, depending upon the proximity of their villages to development poles. The density of population, which can be seen as an indicator of settled life, is lower in the tribal areas than national and state averages.



Annexure 4 - Financing of the Schemes: The schemes are highly capital intensive and are largely funded by the government or the implementing agency through some donor funds. Direct cash contributions have been negligible and only in the case of Jhabua, the people have contributed 50% of the capital costs through loans provided to them specifically for this purpose. There have been cases of the beneficiaries contributing labour but this contribution is not a very significant proportion of the total cost in any of the cases. The prices vary from highly subsidized canal irrigation charges to Rs. 35-40 per hour in the case of PRADAN LI schemes. Most schemes have successfully devised mechanisms of collecting the water charges in advance to avoid default. In practice, however, advance collections are done away with in cases where the

[2] Source: *Profiles of Districts; October* 2000; Centre for Monitoring Indian Economy (CMIE); Mumbai.
[3] Source: *Profiles of Districts;* November 1993; Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE); Mumbai. Derivation of formulae: the weights assigned to different sectors for determining the relative index of development are as follows:

1. Agriculture = 35% [Per Capita Value of Output of Crops (25%) + Per Capita Bank Credit to Agriculture (10%)]
2. Mining and Manufacturing Sector = 25% [Mining, Manufacturing Non Household and Household Workers per Lakh of Population (15%) + Per Capita Bank Credit to Industry (10%)]
3. Service Sector = 40% [Per Capita Bank Deposit (15%) + Per Capita Bank Credit to Services (15%) + Literacy (4%) + Urbanization (6%)]

collecting authority is a users' group. The AKRSP case throws up an interesting mix of partly advance and partly post-harvest collection mechanism. The Wardha LI case study shows the downward slide of an intervention when collection mechanism is lax.

Annexure 5 - Governance: Most schemes are managed by formal or informal user groups. Even the GWRDC managed schemes are in the process of being turned over to the users. In some cases, where the interventions have been NGO driven, the users have been provided guidance and/or training in governance and group building. Such investments made by the NGOs are highest in the case of AKRSP and PRADAN. NGO involvement has also usually led to greater degree of clarity and transparency in rules and governance mechanisms. The enforcement mechanisms range from government coercion and threat of denial of service to social pressure, warnings and even fines levied by the user groups. Traditional leadership has played a significant role in experimenting with and adopting irrigated agriculture. They are the ones who have assumed the lead role in the community based organisations.

Annexure 6 - Operating Procedures: Crop restrictions do not exist anywhere except in Vidharba and in Surat. In Surat, this is caused by the new rotation policy of the irrigation department. In Jhabua, Vidharba and Jharkhand, norms have been developed to limit the area irrigated by a user in times of water scarcity. Proper scheduling of irrigation dates is done only in the case of canal-linked schemes in CS5 and CS6. The responsibility of operating the hardware rests with trained operators employed either by the User Associations or by the government. The operators are compensated for their services in all interventions except where the schemes are for 2-4 users like in Vidharba. The Irrigation Society or often the core management group within the society decides turns for distribution of water and decides on the maintenance procedures either independently, like in the case of Sadguru and PRADAN or in close consultation with the irrigation department, as in South Gujarat. The interventions have fairly reasonable and transparent accounting procedures except in the Central Hills and Plateau regions and in Jhabua.

Annexure 7 - Water Plus: Activities like procurement of seeds, fertilizers, and saplings, mediating for credit supply or arranging for collective marketing, SWC, or mediating irrigation technology have not been taken up by any UA in most cases. Only one of irrigation societies studied under the AKRSP case has recently started procurement of seeds and fertilizers while others have plans to do the same in the near future.

Annexure 8 - Success Parameters: The Capital cost per acre varies widely from 1290 in case of GWRDC to 5714 in case of Sadguru schemes. There is an issue of comparability caused by topography. Jhabua presents an exceptionally high average figure of 7000 probably due to over design as sighted by the case authors. The cost per household follows a similar trend. Head and tail conflicts do not seem to be a major concern except where these are caused due to design faults and/or drought conditions. On an average, 50-80% of the design command area is served by the schemes. While in South Gujarat, the demand for water is much more than the potential supply, in eastern India, the problem is more on the demand side.

Section IV: Key Learnings from the Case Studies

In this section we try to put together our qualitative impressions and understanding about learnings from the six cases individually. It may be noted that each of these case studies is in itself a study of a set of irrigation intervention. CS1 sums up two experiences, CS2 sums up five experiences, CS3 sums up over a dozen chosen out of 63, CS4 sums up 14, CS5 sums up 3 and CS6 sums up 6. The studies themselves draw out lessons that can be learnt from these experiences. Naturally, predilections and dispositions of writers do of course influence the implications and lessons drawn but the case studies provide enough information for a third party to interpret the data and draw inferences.

Learning from CS1 (Sadguru Case Study)

This case study documents the benefits that can be derived by tribals when they participate in an LI scheme that progressively takes up increasing roles unto itself. What seems to be of essence is the need for technically sound water delivery hardware. There also is a need to rigorously follow the discipline in regard to water distribution. This is done through building strong and cohesive user groups. Once this combination (i.e. technically sound and performing hardware and a socially viable user group) is in place, the tribal economy can be placed on an upward ratchet. This is evidenced in the increased food security, adoption of a more profitable cropping pattern, better cropping practices resulting in better incomes and consequent salutary impacts on living conditions of the tribals. To begin with, an LI society has as its members all farmers whose land is in the command areas of the scheme. The LI societies have been following strict norms and those who do not pay water charges are debarred from using the scheme. Membership rises when land is sub-divided among family members. The LI societies themselves have been encouraged to pilot other NRM work like forest management, farm forestry. Most of the NMSWDF schemes are based on water bodies created by locating well-designed check dams at optimal sites in the local streams. The overall impact on the village environment is salutary. The water bodies in the check dam reservoirs naturally tend to recharge aquifers and hence ground water levels in surrounding areas increases. The success of NMSWDF schemes is for all to see. One needs to appreciate some critical points about this model.

1. A consistent and sustained effort at replicating the same basic model in dozens of locations has tended to improve technical design as well as reduce cost of creation of infrastructure.
2. Command area of a single scheme covers dozens of farmers. While efforts to build them into a cohesive user group are necessary, it is futile to expect a group to become enthusiastic about the irrigation society unless it is seen to be completely reliable. Hence technical design and implementation must be impeccable.
3. Tribals in NMSWDF area now are ready for irrigated agriculture. As the case study records, once water is available, tribals do not show any want of entrepreneurial qualities. Elsewhere, where the tribal community is in a lower stage of development, the impacts may not be so dramatic. Yet one must fight against the possibility of citing attitudes of tribals for indifferent performance of schemes that are technically wanting. Perhaps, when the LI schemes of NMSWDF began in early seventies, tribals there were in pretty much the same mental frame as tribals now in Jharkhand and Vidarbha.
4. It is interesting to note that mere provision of irrigation is not viewed as adequate. Support for growing a crop is considered necessary. In the specific agro-climatic conditions of Dahod area, trees were clearly a profitable option and that was used successfully to consolidate the gains to tribal household economy. There of course is a need for patience and sequencing.

Poor precipitation resulting from insufficient water in the check dam also restricts the irrigation potential. Cost of electricity and the length of reliable power supply during peak season is another critical factor. Both these factors are external to an LI scheme and they severely test the LI society. Ability to manage cash flows from water charges paid by farmers and other sources to keep the society working is crucial. The ability to devise shared understanding and acceptance of rationing norms and enforcement mechanisms is also important since disputes on these matters can easily break up a society. It is perhaps necessary that a promoting NGO may have to provide leadership to the tribal community comprising of highly individualistic persons in managing group processes so that these things are achieved. How long would this mean active involvement of the promoting NGO and when would the user groups be able to take over all aspects of management can not be stated in general and will depend on the complexity of each case.

Learnings from CS2 (Jhabua Case Study)

This case study sums up experience of some of the successful lift irrigation schemes installed through government machinery in Jhabua district. These schemes were of varying sizes. Elaborate efforts to build user groups the way NGO were not undertaken by the implementing departments, but users had to consent to taking the schemes and often there was a component of loan while installing them. These successful schemes demonstrate one thing clearly that if the systems in fact work delivering water as expected of them, their impacts on production, incomes and tribal life are significant. Income effect is mentioned at varying between Rs. 6000 and Rs. 9000 per acre of land irrigated. Effect on migration etc. is also mentioned. Absence of elaborate group processes may perhaps hamper smooth running of large systems (those that cover more than 20 farmers in the command), and performance on loan repayment may be variable, but the schemes are seen to be functional through collective efforts of the tribals who find the economic benefit sufficiently attractive to co-operate with each other. In fact causes of failure are seen to be more to do with resource: there not being enough water in the source or the power supply may permit only a limited pumping or some such thing. While the importance of creation of sustainable user groups can not be underestimated, this study does bring out an important fact that technical design and capability to deliver water is perhaps the first and the most important cause for continuation and economic benefit of an irrigation scheme for tribals. Can we infer that technical soundness is more akin to necessary condition for success while making the user group string etc. can lend durability to this success? Two questions that arise are

1) Whether tribals feel otherwise quite certain about the income effect of irrigation? Do they view irrigated agriculture as an alien creature involving many imponderables or do they see it as eminently doable and worth doing?
2) Does the economic benefit of Rs. 6000-9000 make a threshold above which tribals' interest can be assumed and hence their commitment to actions in overcoming whatever infirmities caused by absence of a formal user group become logical? Would they, for instance, have ensured that the defunct components of the systems are put together in working irrigation scheme the moment both water and electricity are available were the income say just Rs. 1000 per acre? In fact what would determine this threshold?

Learnings from CS3 (Wardha Case Study)

ASSEFA, an NGO that worked in Wardha regions had operated a scheme of assisting poor farmers with initiatives in irrigation. Depending upon the water resource and possibility of distribution etc, the organisation created schemes that benefited a large group as in the case of Mahadur LI Co-operative that had 25 members in all. ASSEFA also put together small schemes that benefited a smaller group of three to five members. The schemes were implemented in villages that were close to Wardha as well as those that were in Zari block of Yavatmal district. Most of the tribals benefited were first generation farmers. Before being given land some twenty years ago, they worked as agricultural labourers and of course supplemented their income from the forests. ASSEFA arranged loans from banks for some scheme (The loan was eventually unpaid). Tribals agreed that the subsidy amounts they were to get from the Government would be invested in the scheme. And ASSEFA met the balance through grants. Direct cash contributions from tribals to the scheme were negligible. The tribals did contribute labour for the purpose of installation.

The LI co-operative did not have very specific set of rules regarding crop, number of irrigation and water charges. It was expected that the principle of brotherhood would ensure that no tribal would irrigate more than 1 Ha of land and that they would all share the cost and the benefits. Absence of clearly articulated rules regarding payment for water and even weaker enforcement regarding collection led to gradual cornering of the LI scheme by those who paid their dues. Number of non-users increased even in the relatively better developed Wardha district. In the Zari block, though the schemes are small, there was high rate of non-usage. This was caused by factors such as family disputes, losing electric connection for failure to pay bills, low water level in well, leasing out the farm, clear reference to wage labour etc.

Tribals were not fully convinced about the feasibility and desirability of irrigated agriculture. They preferred alternate sources of livelihood to which they were used. They perhaps did not have enough skills. The scheme came to them nearly free. Where desire to do irrigated agriculture, market for the produce and skills all existed, there was little by way of specification and enforcement of operating rules pertaining to collection of water charges and sharing of expenses on repairs. The scheme ran as long as ASSEFA took interest and then ran only for those who kind of privatised them.

Learnings from CS4 (Lohardaga - West Singhbhum)

This case study brings out an important facet of irrigation intervention in tribal life, namely, the fallacy of the assumption that demand for irrigation exists in all rain fed agriculture. Generalising some of the statements made in the case study one may say that demand for irrigation can arise

1. If the tribal finds it worth while doing the second crop or providing irrigation to an existing long duration crop (subtle though not wholly explicit concept of leisure income trade off is definitely involved here)
2. If he knows how to grow the second crop, (both in terms of skills and information-hence the stress on extension)
3. If he has the money to provide seeds, inputs etc. for growing the second crop,
4. If he believes it is possible to raise a second crop within the constraints imposed by local social institution such as grazing restrictions.

When these conditions do not obtain, the tribal does not take water for irrigation even if the system is working well and is capable of delivering as much water as he reasonably expects.

Learnings from CS5 (PIM in Surat)

This case study brings out both the potential salience as well as feasibility of participatory irrigation management in a tribal area. The key feature is building up local governance structure capable of both responding to peoples' needs and of tackling the technical requirements of the system. AKRSP (I) chose to create a multi-tier social system. In Baldeva for instance, the lowest rung manages water distribution from a minor. The case mentions that such a formulation of the lowest social unit for management was a happy choice because it more or less coincided with one village, which perhaps in a tribal context may also mean one clan.

It is interesting that after one PIM group was built by AKRSP, farmers on their own initiated PIM in the command of the neighbouring system (Pingot LBMC and Pingot RBMC). Government systems are creating surface huge irrigation infrastructure that has low effective utilisation. The potential efficacy of PIM is in making the unused and defunct infrastructure deliver what it was meant to deliver. When viewed in isolation of the investment made in creation of the original infrastructure, PIM systems offer very attractive cost benefit ratios. The limiting factor would appear to be the size of the command one wishes to bring under PIM. If the lowest technical rung does not coincide with a neat homogeneous social category what does one do? However, this doubt is more pertinent to the subject of PIM rather than to irrigation for development of tribal communities.

The case study seems to imply a flying geese pattern of development: more advanced Patel farmers take to irrigation the fastest and they serve as models to tribals nearby. The latter learn and perhaps emulate from the Patels.

1. If an irrigation infra-structure is in place, then PIM appears to be a cost effective way of increasing area actually irrigated. Some questions need to be looked at carefully before one can generalise from this study regarding utility of PIM.
2. Is the irrigation infra-structure capable of delivering water if the issues of distributary maintenance etc. are solved? It may be noted that most systems have failed to deliver water in west India in the last three four years due to drought conditions. There could be other technical glitches etc.
3. Does the tribal community appreciate the advantages of and know how to use water?
4. Are the communities living at head and tail regions share any thing at all? In fact perhaps, it could be that Head region communities are progressive farmers from higher caste (who themselves might have acquired the lands through a protracted process of land alienation from these very tribals). Usually, the people in the Head regions prosper faster, develop a vested interest and also build unholy alliances with the bureaucracy.
5. Other than moral pressure and perhaps a mild invective from the irrigation bureaucracy, what incentives can be offered to Head communities to behave so the tail-enders get water?

These are of course general questions about PIM. They become some what complicated by the fact that one is dealing with tribals as potential users. We wonder if it would be fair to conclude that AKRSP(I)'s long presence in the regions where PIM was done, relative homogeneity of the communities, the small size of each scheme and perhaps some kind of *quid pro quo* along with pressure from their brothers in the tail end have all worked together in these successful cases.

Learnings from CS6 (GWRDC Case Study)

This case study has looked at the lift irrigation schemes set up by GWRDC. Some of these schemes are managed by users groups (co-operatives) and some by GWRDC directly. As expected, GWRDC management has tended to suffer from rigidity and bureaucratic procedures. When the scheme, so managed, benefits farmers including an influential or politically connected farmer, his lateral influences help to cut through the procedures quickly and the management becomes more responsive to users. Else, there are problems of delay etc. The authors have found that, on an average, schemes managed by user groups perform better than those managed by the GWRDC.

User-managed schemes levy higher water charges and collect a much greater proportion of levied charges. Hence they have more money to invest in repair and upkeep of the hardware of the schemes. Such schemes have also tended to enlarge their own roles by assisting farmers in on input or output side.

Upward Ratchet of User Managed Schemes: "Higher charges-higher collection-more surpluses-regular upkeep-flexible operating policy-greater reliability-greater benefit to farmers-more willingness to pay"

Downward Spiral of GWRDC Managed Schemes: "Low tariff indifferent collection-absence of own funds to maintain-dependence of higher ups-poor responsiveness-irregular maintenance-lower reliability-particularistic treatment of powerful users-alienation of ordinary members-indifference and anomie-high entropy systems"

Though there is a move to hand over management of more schemes to user groups, this is happening at a slow pace. Schemes tend to be large. The number of farmers involved is thus high. Their organisation does not automatically spring up. In the absence of an organisation that welds the users in one group, the scheme can not run properly. It would appear that the farmers who are in a position to obtain some water from the schemes even under GWRDC management, possibly by using their social links or by greasing the palms, have no incentives in forming a group and adhering to its discipline.

that ensures that these work well and the distribution system runs as per planned or designed. Thus this is essentially a socio-technical question.

Water availability in the source is clearly an important issue here. Depending upon the kind of scheme, this may depend on the nature of aquifer, length of water flows in the streams, rainfall, quality of check dams etc. On the side of providing water to farmers, additional issues involved are water use restrictions and quality of power availability. CS2 has shown the instance of an intervention that fails to deliver water because failed monsoons eliminate the possibility of using water from streams. CS3 has indicated that the LI society restricted the acreage of each farmer so that each of the members would get some benefit. CS6 provides example of an intervention that must restrict crop choice to suit the way the larger irrigation system releases water in the canals. In fact, limitation on power availability automatically reduces the effective command of a LI society and also affects its viability. What seems to work in this respect is the ability of the governance structure to devise norms for restricting crop choices or restricting area irrigated etc. to match the constraint imposed by these external factors.

Actual water access by farmers is a function of the discharge of water from the source as well as management of the distribution network. Most (but not all) systems that are designed to serve a group of farmers involve some variant of head vs. tail problems. In a public canal system that is unable to enforce discipline or ensure maintenance of distributaries, this problem is most acute. A poorly designed system of distribution chambers and pipes can also mean that some one in the command would not get water (an instance of this has been reported in CS6). And break down of the norms of distribution can always lead to complete chaos. CS4 has shown that keeping the discharge so low that at any given point of time only one farmer can take water has a unique advantage of making the system robust. This method also automatically achieves consistency since the case mentions that farmers themselves have to spend the diesel for running the pump when they are irrigating. CS5 mentions how elaborate norms for penalties for breaking the discipline of distribution and their ruthless enforcement is a must for eliminating the head-tail problem. It is interesting to note from CS3 that a person whose farm has the well on which a group scheme is based seems to acquire extraordinary power and can breach this kind of a discipline. Do we detect a problem of combining a commonly shared hardware on an individually owned water source? Is that a problem *ab initio*?

Clearly consistency is the key to achieving smooth operations. The specific way that will ensure consistency is a function of the complex reality that prevails in a given intervention. Rationing of water in case of paucity is painful but becomes necessary to maintain fairness in a group scheme. The rationing method may result in restriction on area irrigated, restriction on crop to be irrigated or restriction on the time for which water will be made available. The matter will be influenced by the specific distribution schedule followed by a larger system of which the intervention may be a part (CS6). CS5 documents that farmers had attempted to achieve some degree of equity by changing the release pattern and distribution norms, but then observed that this caused a great deal of water wastage.

Whether farmers will use water will depend on whether they find it affordable. This brings in the question of both the quantum and mode of payment of the water charge. In this regard, the observed diversity is the highest. Established and mature interventions managed by experienced NGOs have systems that are elaborate and rigorously implemented. CS4 mentions the charge as having two distinct components: price of diesel to be borne by the farmer himself and then the charge for the irrigation system operator. Every thing is payable in advance. CS1 also mentions that charges are collected fairly strictly but indicates an instance of a farmer who did not pay the due charge, clearly indicating that it was not collected in advance.

Individual vs. Group Processes: A problem deliberately invited?

It is important to note that all the six case studies document experiences of creating irrigation initiatives that benefit a group of tribals. CS3 and to an extent CS2 mention schemes for small groups, yet none of them have discussed individual schemes. Clearly there is nothing inherently undesirable about individual schemes. We speculate that the reasons why group schemes are preferred by implementing agencies are:

- The water source is a common property resources
- Technology of surface or lift irrigation schemes in general becomes viable only if the command has a certain minimum acreage
- NGOs start interventions with the explicit intention of livelihood enhancement of tribals and have naturally sought instruments that enable them to impact many rather than a single household in one attempt.
- NGOs like PRADAN, Seva Mandir or AKRSP (I) keep goals like collective empowerment of tribals super ordinate and use schemes such as irrigation and watershed development as instruments to achieve this goal, therefore group processes are inherent.

Yet we recognise that the governance issues brought in by creating a scheme designed to benefit a group of tribal individuals rather than just one individual are not inherent to the task of using water for livelihood enhancement.

The importance as well as the methodology of integrating group formation processes with the task of creating, installing and running irrigation initiatives has varied across the six examples. CS5 and CS6 show examples where technology that can work only on a large scale was sought to be implemented by State without worrying about creating strong empowered user-groups. This default was cited as a reason for their underperformance and the revitalisation process essentially starts with group formation to better maintain and use an existing infrastructure. The efforts in group formation are not very elaborately dealt with in CS1 but its current state and outcome are mentioned. CS2 again documents no efforts what so ever to form or manage user groups as cohesive social units. CS4 by contrast mentions the primacy of social processes and has tended to find positive relationship, ceteris paribus, between the quality of the group and the performance of the system, CS3 documents how the effort of the creation of the LI society was almost a crowning glory of the group processes in the village and how its decay was essentially due to weakening of the group.

There are some interesting questions about this matter.

a) Normally one presumes that relative homogeneity among a group helps weld it together into a functioning cohesive social unit. In fact concepts like group affinity are based on this premise. Yet clearly, command of an irrigation scheme need not include only farmers who can fit in this neat affinity group. In fact they often do not. CS1, CS2 and CS4 are unusual in the sense that NMSWDF, the MP Govt. and PRADAN respectively deal there with villages largely or exclusively populated with tribals. Elsewhere, the "interference" from non-tribals is to be expected. And even if all farmers owning land in the "natural command" of a scheme were tribals, there could be and is heterogeneity on other scores: education level, salaried employment, external networks, power position etc. Hence the issue is how one balances the affinity group kind of requirement with the reality of heterogeneous group members.

b) The second issue is of timing. Is it better to first start building a group as PRADAN does or is it better to start with the hardware? In the former case, people have very little in common except that they are all poor and if the ground developments regarding the scheme are delayed, their incentive to hang together may be further dampened. If the hardware comes first, its design and lay out may become a source of friction rather than cohesion. And simultaneity, as we are sure would be recommended and claimed would mean that the engineer must double up as a social worker!

c) The third is the necessity of creating domain centrality. The group is meant to maintain, run and use the irrigation scheme. Its norms and procedures must be aligned to that task. Achieving this in a situation where no one knows the irrigation technology (as in CS4) or feels powerless in the face of a large bureaucracy (as in CS5 and CS6) or when has never used machines like electric pumps (as in CS1 and CS3) is not an easy task. The reason is that group members themselves are not at all familiar with the likely conflict points as the scheme enters its first, second or the third year. Hence the group may attempt to muddle through the expedient and the convenient and this would set its own dynamic in motion. For instance in CS3, tribals seriously believed that they just have to pay the electricity charges and maintain the pump, without worrying about replacement. And they "learn" through their social seniors that electricity charges are "stretchable", so no one pays! This technology of creating domain centrality by building in norms about behaviour that address most of the potential issues needs to be demystified!

d) Conflict resolution is an important part of the group processes. Some points of conflict and the ways of handling them have been documented by the case studies. A schematic summary is given below:

Cause of Conflict	Method of Avoidance	Method of Resolving Conflict
Taking water out of turn (CS5)	Fixing schedules with all round consultation	Announcing fines for breach and policing behaviour
Not paying for water in time	Group consensus on whether credit is to be allowed	Cutting water supply, group pressure for recovery etc.
Not paying at all	?	As above
Rationing necessary due	Consultation about rationing of water for equitable benefit	As in 2
Faulty operating procedure leading to breakdown in supply	Evolving better procedures through learning	?
Group has no money for a repair/ replacement	Creating reserve fund	Spot collection before ordering repair/replacement

Some groups are unable to resolve conflicts (e.g. CS3). In such situations, the scheme slowly starts deteriorating. It appears that presence of an external party such as the promoting NGO helps in conflict resolution. For instance in CS3, withdrawal by ASSEFA caused slackening of the group processes and the LI scheme started moving downhill. AKRSP (I)'s presence has helped the PIM groups manage conflicts effectively. NMSWDF's presence is of great support to LI co-operatives in taking tough decisions such as cutting water supply from a member's farm.

Section VI: Conclusions and Ways Ahead

In this section, we try to answer some the questions posed at the beginning of the Central India Initiative and present a refined set of hypothesis and research questions for the second phase of the Initiative which will include more detailed case studies of around 20-25 case studies in the Central Indian tribal belt.

Some Posers

What exactly do we mean by 'Demand Creation'?

Experiences suggest that even after provision of irrigation facilities, tribals have not taken to irrigated agriculture very enthusiastically. Does this mean that there is a lack of demand? To understand this better, we try to separate the two components of demand as follows:

Demand = Desire + Ability

Is there a lack of desire or is there a lack of ability? Often implementing agencies assume lack of demand to mean a lack of desire. Sometimes, this is also used as an excuse for poor supply side factors and as an excuse for poor program implementation. We feel that both the components of demand should be looked into in greater detail before the blame for poor performance is put on the tribals.

Should one first make tribals into good farmers before investing in an irrigation initiative?

Repeatedly the issue of non-use or withdrawing from use have been discussed. We have looked at this question earlier while discussing tribal way of life as well as the perception of risk and return from intensive agriculture. This question is relevant only when the tribal community falls in development category 1 or 2. We wonder whether in such cases it is advisable to train tribal farmers into good cultivation practises for growing crops under rainfed and under retained moisture conditions, demonstrating yields stabilise and improve etc. before undertaking the investment of time and effort in an irrigation initiative. This may be done at ease along side the process of group formation and construction/installation of hardware. In this context, it would also be useful to look at interventions of organisations such as *Samaj Pragati Sahyog* (SPS) in MP which encourages retention of soil moisture and avoidance of the need for irrigation.

Should one attend to social institutions first?

In similar social ecologies as relevant for the first question, attention is needed to identification of and attention to the social institutions that act as hindrance to intensive agriculture. Free grazing is of course the most important institution of relevance but there may be others-such as unquestioned sharing of horticultural produce. Several farmers in mainland settled agricultural settings in Gujarat, MP, Maharashtra and Karnataka state that the principal reason why they do not grow vegetables in their farms is that it is assumed that any neighbour can freely pick the vegetables! It appears that there is a well identified category of farmers who grow vegetables for market: vaghris, malis, kuiris etc. The rest are "above" this way of life and hence if there are vegetables on their farms, well, of course they can be taken! Taking vegetables from a vaghri or a kuiri is a theft since he depends on selling them, but one can take them from a patel or a jat farmer and he should be more than willing to give them! Till the time irrigated agriculture is in conflict with social institutions such as free-grazing regimes, it cannot be acceptable.

Are group schemes a must? Do they have to be managed by tribals from the very start?

If there are serious hurdles in making tribals take to intensive agriculture itself, why load the intervention with the quasi-ideological baggage of making it an instrument of empowerment? Is it not better that tribals are given very small irrigation schemes that they can manage as individuals and encourage them to grow second crops on their farms at least in regions where natural resources permit it? Should one not experiment with water harvesting, water extraction, water application and crop technologies that make for feasibility and ease of management at individual level rather than insist on large capital intensive scheme that have to be designed for a group of farmers?

We use the development categories listed in Box 1 to classify the refined research hypothesis:

Development Category 1: Hunting, Gathering and Rudimentary Farming

This category of tribals still lives almost like children of nature, depending upon hunting, gathering and very rudimentary farming. For them, livelihood opportunities from the jungle are available and they prefer them to a settled agriculture regime. They are understandably hesitant and non-responsive to irrigated agriculture based livelihoods interventions. 'Demand Creation' is a real issue with this category. There are also issues of preserving their traditions and culture and of its relevance to the environment and natural resources.

The significant research questions for this set of tribals would include:

1. Is settled agriculture a better means of livelihood, from the point of view of the individual, the social group and the environment?
2. Is it advisable to transform tribals into good rainfed farmers first? Demonstrate cultivation practises for growing crops under rainfed and under retained moisture conditions, demonstrating yields stabilise and improve etc. before undertaking the investment of time and effort in an irrigation initiative.
3. What role can the government and the NGOs play in this context?

Development Category 2: Rainfed Agriculture, High Dependence on Migration and Forests

This category of tribals have started taking farming as a serious livelihood option but continue to depend heavily on migration and forests. There is a greater degree of awareness and acceptance about improved agricultural practices. Irrigated agriculture is rare though and there exist sporadic cases of intensive agriculture. 'Demand Creation' is still an issue but equally important is the issue of bringing out and sustaining the latent demand.

The significant research questions for this set of tribals would include:

1. Does a provision for irrigated agriculture necessarily mean better economic returns compared to a rainfed kharif crop plus migration?
2. Are there any social institutions, such as practice of free grazing, that are in conflict with a shift to settled irrigated farming?
3. What would be the best set of interventions, depending upon the local conditions, and how best to manage them? What would be the appropriate 'withdrawal' strategy?

Development Category 3: Regular Farmers, Constraints of Natural Resources and Investible Funds.

This category of tribals is very much aware of the benefits and practices of irrigated agriculture but have not been able to adopt the same due to varying reasons such as: lack of investible funds, constraints of natural resources, lack of knowledge and skills, poor access to markets, indebtedness etc. They practice rainfed *kharif* agriculture and grow largely food crops. They continue to depend on migration and in the absence of availability of farm-labour, migrate to far off places for several non-farm occupations as well. The issue of sustaining demand is more important than the question of 'Demand Creation'.

The significant research questions for this set of tribals would include:

1. How did the tribals shift to settled farming?
2. What are the monetary requirements for a shift towards extensive irrigated agriculture?
3. Do the farmers have access to sufficient credit facilities, markets and know-how? How best can these be ensured?
4. Do the irrigation interventions necessarily need to be at a community level? Is there a scope for small-individual based interventions?
5. What are the supply side constraints and how best to tackle them?
6. What are the differences in response and returns amongst the tribal community?

Development Category 4: Enterprising Farmers, High Awareness Levels

This category of tribals is already in the business of irrigated agriculture and cash crops though they still lag behind the more enterprising and successful non-tribals farmers in terms of crop yields. The demand for irrigation very often exceeds the supply. There is a high degree of awareness, not only about the benefits of irrigated agriculture, but also about improved techniques and practices. They have strong linkages with the markets. Overall, it is very difficult to distinguish such tribal farmers from other non-tribals facing similar economic constraints. In this context, the more relevant questions are related to the management of the interventions.

The significant research questions for this set of tribals would include:

1. What process/policy encouraged the tribals to practice extensive irrigated agriculture?
2. What was the role played by traditional leadership in the transformation and management process?
3. Are there significant differences between the yields and returns of tribal and non-tribal farmers? If so, then what are the reasons for this?
4. What are the specific set of management practices that ensure smooth functioning of the irrigation systems?

Broadly, the Phase I case studies reiterate our understanding that the livelihood impact of a concerted irrigation development program can indeed be positive and very significant. On the question of "Demand Creation", success of an irrigation based intervention, we believe, depends on two factors. One, which is a necessary but not sufficient condition for success, relates to technical excellence in terms of design of the scheme, choice of hardware and its proper installation and the other relates to management of all the issues that interfere with smooth delivery of the service including institutional design and organisational issues. Also, on the

question of a different tribal world view, we understand that it is important to study the different stages of development on the path towards enterprising agriculture and then sequence the interventions in such a way that the transition does not become knee-jerk and awkward.

Ways Ahead for CInI...

This synthesis will hopefully aid future inquiry under the Central India Initiative. It is perhaps important to encourage authors of case studies to be done in Phase II to gather data on all the parameters shown in the rows of tables in Annexures 1 through 8. This will add a great deal of specificity to the case studies. It may be worthwhile for the authors to also understand and document the various points of conflict that arise between the users and the management of the scheme, the specific ways of managing these conflicts they have seen in that initiative, the degree of its efficacy and the consequences on the success or otherwise of the initiative. Attention may be paid to actual benefits derived by people and try to attribute them to water, water plus initiatives and to overall "Hawthorne" kind of effect. The judgment whether an initiative has been successful on the five levels of questions also needs to be formalized and perhaps the protocol may include suggestions as to how would the authors themselves assess the initiatives they study. Finally, the authors may like to comment as to why the initiative has worked/not worked in the specific locale they have studied.

At the end of Phase I, the initiative is now ready for the second set of case studies and already around a dozen potential case leads have been explored. These include irrigation interventions across the Central Indian tribal belt, proposed to be studied in partnership with a large set of government and non-government organisations working in the area. Some of these include Seva Mandir, Rajiv Gandhi Watershed Mission, NEEDS, XIDAS, Samrakshan etc. Two IRMA students are currently working with us, as part of their Management Traineeship Segment, in exploring case leads and identifying suitable partners for Phase II. The two students will also undertake two short-case studies to test the wider applicability and robustness of the Phase II protocol and to test and refine further the research questions before we move on to Phase II. A review of the existing literature is also underway and is expected by the end of December. A draft proposal for the second phase will be presented at the IWMI-Tata Annual Partners' Meet in January 2003 in the Central India Initiative Session. The same will be suitably revised after feedback from our partners before submitting it to SRTT for financial support. The proposal shall include the following:

1. A refined set of research questions for Phase II.
2. Expected Outputs in terms of a workable strategy for irrigation based livelihoods promotion in Central India.
3. A list of identified and explored case leads for Phase II.
4. A protocol for Phase II case authors.
5. A proposal for financial support.

Annexure 1: Physical and Agro-climatic Features

Item	CS1		CS2	CS3		CS4		CS5		CS6
Locale	**Dahod**	**Banswara**	**Jhabua**	**Wardha**	**Yavatmal**	**Lohardaga**	**West Singbhum**	**Bharuch**	**Surat**	**Vyara Taluka, Surat**
Rainfall	828.00		786.00	1225.00	1125.00	1326.00	1433.00	1031.00	1538.00	1538.00
Number of Rainy Days			20.00	40.00	50.00	51.60	50.00	44.00	56.71	56.71
Rainfall Pattern	Unimodal		Unimodal	Unimodal		Unimodal		Unimodal		Unimodal
Soil Type	Varies with elevation, sandy to deep black		Varies with elevation, sandy to deep black. But clay and loam are common. Now eroded in slopes	Shallow	Black	Degraded soils and undulating terrain / clayey soils, homestead land mostly sandy loam type		Black	Aluvial	Aluvial
Formation	Hard rock		Hard rock	Satpura Range	Deccan Trap	Igneous Hard Rock		Hard rock		Hard rock
Major Kharif Crops	Maize, Rice		Maize, Cotton, Black Gram	Cotton, Tur, Sorghum(Jowar)		Paddy (low and medium upland) and little of maize (in homestead land)		Paddy		Paddy
Length of Flow in Streams in Recent Years	November		November	October	January	April		December		December
Forest Cover	Completely barren		Completely barren (17% in district)	Fair with good shrub forests	Good Mostly Teak	29%	33%	25%		27.42%
Socio-Ecology	Egalitarian but dominated by money-lenders		Egalitarian but dominated by money-lenders	Quiet feudal		Dominated by traders and those linking to urban and growth centres		Patels and tribals in 10% to 90%. Patels have more land and influence.		Non Tribals Dominate even when they have less land! Within tribals also, there is a hierarchy – Dhodia Patels, Chaudharies and then Gamits in that order
District's agri output per Ha	3069		3595	9987	7995	5209	6943	7500	15661	15661
District's CMIE devp index	40	45	34	99	64	53	68	96	154	154

Note: CMIE index of relative development (see CMIE. Profiles of Districts, Nov. 1993, Mumbai) places districts in a scale of overall development.

Annexure 2: Infrastructure Development and Economic Opportunities

Item	CS1		CS2	CS3		CS4		CS5		CS6
Locale	**Dahod**	**Banswara**	**Jhabua**	**Wardha**	**Yavatmal**	**Lohardaga**	**West Singbhum**	**Bharuch**	**Surat**	**Vyara Taluka, Surat**
Roads	Good in Dahod, less so in Banswara		In patches, but inferior to Dahod roads	some villages (4-5) remain cutoff during monsoons		Medium linkage to some nearby centre but generally poor for regular trade		All villages are well connected with state highways		Most villages are well connected with state highways
Electricity	Available		Available	Yes		Poor supply		Yes		Yes
Diesel supply	Available		Available	No		Ok mostly (within 4~5 km)		Not applicable.		Not applicable.
Number of Days of Livelihood from the Jungle	0		0	75		120		0		0
Role models in agriculture	Kheda, Vadodara and Mandsaur farmers		Kheda, Vadodara and Mandsaur farmers	Yes, e.g Yenidorka but few	None	Mahatos farmers in L'daga	Some tribals in Manoharpur	Patel farmers of Surat		Patel farmers of Surat
Nearest Development poles	Ahmedabad		Indore/Ahmedabad	Nagpur	Yavatmal	Ranchi / Jamshedpur/ Rourkela		Surat and Mumbai		Surat and Mumbai

Annexure 3: Social Attributes

Item	CS1		CS2	CS3		CS4		CS5		CS6
Locale	**Dahod**	**Banswara**	**Jhabua**	**Wardha**	**Yavatmal**	**Lohardaga**	**West Singbhum**	**Bharuch**	**Surat**	**Vyara Taluka, Surat**
Name of the tribe	Bhils	Bhils	Bhils	Gond and Kolam	Kolam	Oraon	Ho, Mundas & Mundari	Vasava	Vasava	Vasava
F literacy (%)	13.00%	13.00%	12.00%	41.00%	23.00%	10.00%	0.00%	49.00%	55.00%	26.70%
Population density of the locale	180		166	109	149	338	210	226	203	269
Development* Category	3		3	2	1	1 : Sombra, 2: Kansara , Tiko Kumbhatoli, Tiko Bondatoli, 3: Matkambera, Salgi Rijhitanr, Bhargaon Beratoli, Saheda Patratoli , Chittri 4: Kundubera, Banjhikusum, Kamarbera, Taku patratoli , Saleiya Ambatoli		3-4; more closer to 3 than 4 but slowly moving towards 4.		3

*To some extent. except for saleiya ambatoli, kunudbera, banjhikusum, taku patratoli, bhargoan beratoli, Chitri some populationw as dependent directly or indirectly to some extent

Annexure 4: Financing of the Scheme

Item	CS1	CS2	CS3	CS4	CS5	CS6
Locale	**Dahod & Banswara**	**Jhabua**	**Wardha & Yavatmal**	**Lohardaga & West Singbhum**	**Bharuch & Surat**	**Vyara Taluka, Surat**
Capital Cost	Check Dams – Rs. 12,60,431.25 (avg) LI – Rs. 13,37,024.00 (avg)	119000 – 650000 (10650 – 29000 per HP)		Rs. 88,100 to 178769	Not known	For Scheme 53: 3.74 Lakhs
Direct Cash Contribution by Users	NIL	50%	Nil	Meager just for buying registers and books.	None	None, cost borne by GWRDC
Labour Contribution by Users	Yes, but not a lot	Pipeline excavation done by farmers		Yes, not more than 10-15000 rupees in any case.	some for rehabilitation before turn over and for R&M after turnover	None, except now in the case of turned over schemes
Price of Water	Rs. 20 per hour in Jher; Rs. 140 per acre in Mahudi; not mentioned elsewhere	No mention		35	Varies from crop to crop, and system to system, please see table 9 in the main paper	Rs. 200 + office charges*
Creation of a Maintenance Fund	Not mentioned; the Co-ops do have savings	No mention	No	Yes but the group fund does not exist in some cases(failures)	Yes, there is one, but we found no evidence of how it was being exactly used.	No fund, annual charges for schemes handed over, managed by GWRDC otherwise
Collection Mechanism	Advance	No mention	No fixed charges, instead the costs are supposed to be shared	Coupon system with coupons to be issued by treasurer against payments of charges and release of water against coupons by the operator.	Water prices are collected partly in advance in some irrigation societies, but most pay after harvesting.	Water charges collected fully in advance by GWRDC and partly in advance by Irr. Societies

* GWRDC's present water charges (a mix of Volumetric and hourly rates) can be better understood from the following table.

Depth of water (in inches) over 'V' notch	Assumed Discharge (LPS)	Water Charge (Rs/Hr)
6	12.6	5.5
6.5	15	6.5
7	18	8
8	25.6	11

An annual interest of 12% is charged when the dues are not paid for two seasons. When the system needs any repairing, the operator makes a written complaint to the SO, who makes an estimate of the repairing required and sends it to his senior officials for sanction. The DEE can sanction up to Rs 500, the EE up to Rs 5000 and the SE upto Rs 10000 for the repairing. When the required amount is more than Rs 10000/- the sanction has to be obtained from the head office in Gandhinagar. The normal time taken for repairing the motors varies from a month to even a year depending on the magnitude of the problem. Rs. 200 per Acre + Rs. 10 (clerical charges) advance collected in the case of GWRDC managed schemes. GWRDC pricing is volumetric Rs. 1.20 per 10,000 litres (Irrigation is provided to the tribal farmers at Rs 1 subsidy per 10000 litres. The actual rate is Rs 2.20 per 10,000 litres) Irrigation Societies takes Rs. 100 per acre advance and charge at Rs. 12-20 per hour

Annexure 5: Governance

Item	CS1	CS2	CS3	CS4	CS5	CS6
Extent of User Control	Users control the schemes under guidance from SADGURU	In formal Group dominated by chairman	Dominated by the Lead Partner	More or less control in hands of users only	High, so much so that the irrigation department hands over the key of the main reservoir to irrigation societies during the season	NIL in case of most GWRDC managed schemes. * HIGH in case of turned over schemes
Training of Users in Governance	Not Mentioned	Nil	Yes	Intense efforts on training on many matters including governance	AKRSP (I) has been involved in training 3 irrigation societies.	NONE, except for a few visits by the govt. officials
Group Building Process	Moderate-High	Nil	High	High by design, intensity differs across schemes	AKRSP(I) has invested 5-8 years in all systems except 1	NEGLIDGIBLE
Clarity and Transparency in Rules	Yes	Nil	Yes	Usually high but in some cases esp. failures lost somewhere in between as no legal structure exists.	Yes, rules are simple and fair and transparent	Lacking...
Rule Making Process	NGO driven participatory process	Nil	NGO Driven	Mostly few limited to progressive farmers / leaders – barring few exceptions.	Rules made by the irrigation co-operative as per government guidelines and then approved in the GBM	GWRDC decision making sarkari Societies follow the participatory process...GBMs etc
Enforcement Mechanism	NGO Driven + Social System	Collective responsibility combined with social Pressure	Weak	Social system, threat of de-recognition of community and threat of police complaint	Good in all the system, ranges from warnings to fines. Please see table 10	GWRDC – coercion; Irrigation Societies – Social Norms
Role of Traditional Leadership	High	Chairman of UA (High)	High	Traditional leaders have taken up the mantle of popular leaders	Patels have emerged as leaders in 2 villages, and tribal leadership in other 2	High in case of turned over schemes since there, one or a small group of individuals have gone out of their way to manage the society
CBO Network	High...irrigation Coops	Low **	High, Gramsabha, SHG etc. but all have gone to pieces	High, SHG	Moderately high	High only in case of turned over schemes

* Except in one case where the farmers are politically powerful and flex their political muscle to get work from GWRDC.
** Informal Group under 1-2 main leaders who act on behalf of group.

Annexure 6: Operating Procedures

Item	CS1	CS2	CS3	CS4	CS5	CS6
Fixing Crop Restrictions	No	No	Yes	No restrictions	No	Yes...only for cane to suit canal release schedule.
Fixing Limit on Area	No	Yes in case of scarcity (Equal land area to be irrigated by all users)	Yes	decided in meeting of WUA by members present in the meeting	No	No
Start Date of the Irrigation each Year	Not Fixed	No mention	Not Fixed, usually October for Cotton	No fixed start date , generally mid October in Rabi. Some times emergency irrigation in Kharif	Fixed	Fixed with common knowledge
Responsibility of Running Hardware	Irrigation Society	Users	With the Lead Partner	Operator	Yes	Secy of irrigation society or GWRDC man
Deciding Turns	Yes, Irrigation Society manages distribution	No mention	No fixed programme,	President / secretary / treasurer / operator –usually they form the core group. In few sites the operators himself decides after once the matter was discussed in the meeting of WUA.	Yes, in conjunction with Irrigation department	Yes
Rationing Rules	Not Mentioned	No mention	the person in whose field well is situated has a first right	No rationing usually. Delivered as per need of whose crop is dying first.*	Yes	Yes
Maintenance Procedures	Water charges incl. R&M costs, Co-ops manage	Users collect and pay for the repairs	Users contribute	Operator's responsibility, and if needed a man is brought from outside.	Yes, at least theoretically, but not sure how much is followed	Yes, theoretically, but not strictly followed
Compensation of the Operator	Yes	No mention	None	Rs3-5 per hour of operation	Yes	Yes, Irrigation Societies pay Rs. 1200 per month **
Accounting Process	Fairly formalized and transparent	No mention	None	Training by PRADAN and managed by the users themselves in a register. Proper written records. Need to be presented to users by treasurer in every meeting of WUA usually not so depends on faith of people.	Yes, also audited by government CA	Yes, society accounts are audited under Gujarat Coop Societies Act Norms

*And mostly resolved by some affording and others not being able to afford. Scarcity is like non availability in a season rather than lesser availability than demand in a season means if no water is less no one will cultivate.

**GWRDC has more than one scheme under one operator. This is due to freeze in recruitments and also there are problems of transfers

Annexure 7: Water Plus

Item	CS1	CS2	CS3	CS4	CS5	CS6
UA Procures Seeds	Not mentioned	No	No	No such case observed	Yes, but only in 1 out of 4, while 2 others want to do so in future	No
UA Procures Fertilizers	Not mentioned	No	No	No such case observed	Yes, but only in 1 out of 4, while 2 others want to do so in future	No
UA Procures Saplings for Plantations	Not mentioned	No	No	No such case observed	No	Yes in one case
UA Mediates for Credit Supply	Not mentioned	No	No	No such case observed	No	No
UA Arranges for Collective Marketing	Not mentioned	No	No	No such case observed	No	No
UA has taken moves for SWC	Not mentioned	No	No	No such case observed	No	No
US is Mediating Irrigation Technology	Not mentioned	No	No	No such case observed	No	No

* UA is not a live phenomenon, restricted to 2-3 main interested farmer leaders acting on behalf of user group.

Annexure 8: Has the Intervention Worked?

Item	CS1	CS2	CS3		CS4	CS5	CS6
Capital Cost per Acre	Check Dams: Rs. 5016.64 LI Schemes: Rs. 5713.78	20000 per Ha	3636	2371	4500 (average fig.)	NA	Rs. 3226.72 per Ha of GCA; Rs. 1322.61 per Ha of Maximum Utilization(Scheme 53)
Capital Cost per Beneficiary	LI: Rs. 21088.71 per Household, Check Dams: Not Specified	6263 – 54166 avg. 17373.25	14,180	14,925	6000 (average fig.)	NA	Rs. 2114.69 per family (Scheme 53)
Does water reach every one in command?	No Mention	Not in drought years	Yes		Yes it can	More or less except when there are technical problems	More or less except when there are technical problems
What proportion of area actually receives water?	Claimed to be 100%	No Mention	Not Mentioned		ALL who want water get it; See 1	50-80% area , See 2	50-80% area , due to technical rather than managerial problems
Is "tail end" like problem endemic?	Not Mentioned	In failure cases	Yes in cases of undulating land		NO	Not very, though it exists and some societies do have procedure to solve it	Yes...fields away from the outlets seldom receive full water
Do people get enough water to raise second crop?	Yes	Only in Normal rainfall years	No	Yes	Yes except in years of bad rains.	No, limited to one season only, that too summer season and not rabi	No
If not why?	-		Undulating structure of land	Na	Paucity of flows	Less water	Canal Rotation policy
What proportion of the tribals in the command do not use water?	NIL (Claimed)	No mention	37%	48%	3 % (salieya ambatoli) to 94% (saheda patratoli)	All use unless water does not reach their fields due to technical snag.	Roughly 30-40%
Has the UA done any thing about it?		No mention	No		Claim to have tried to make people understand to run together. See 3.	Very less except petitioning to government	Not Much
How many years running is irrigation being given	5-7 years	5-10 years	7-8	7-8	0 – 10	5 years plus	1986 onwards
How is the repair of equipment managed?	By the User Groups...	Users collect money and get it done	Users themselves spend		By operator or external repairman / through maintenance fund or through collection by the WUA members	Small repairs are done by the co-op, for major ones they look forward to the Irrigation Dept.	GWRDC is supposed to manage this in case of GWRDC managed schemes but it takes too long. Societies manage the R&M much better

Does one see big increments in income?	Yes	Yes in some cases 8	No(see below)	Yes See 4	Yes, (please refer table 13 of the study)	Yes, especially in sugarcane.
Does one see reduced migration?	Yes	Yes , migration period has reduced and not all family members migrate now	Na, since people do manage to get forest based jobs	Yes	Yes	Yes
Does one see evidence of increasing household assets?	Yes	No Mention	No	Yes . See 5	Perhaps but no concrete data	Perhaps but no concrete data
Have the major equipment come up for replacement? Who replaced them?	Yes...irrigation Society	No	Yes, by GSST, NGO that took over from ASSEFA	Has happened, UA manages it. For details see 6.	NA. Irr. Dept. Maintains except in one society which spent close to Rs. 36,000 on R&M	Legal resp. Is GWRDC, it is bankrupt. Recently a sugar co-operative has sanctioned Rs. 10 lakhs to GWRDC for the revival of a few schemes. However, people are not consulted even now to plan the repairing work.
Other evidence of success		Some farmers taking to commercial agriculture	Increased Food Security. Adoption of contour bunding, drip etc. / Increased Food Security for the farmers	Several See 7	The Demonstration Effect created by the successful AKRSP Interventions is a good indicator of success.	

1. Only in few cases taku patratoli , tiko kumbhatoli will this situation arise if significantly larger numbers take to irrigated farming
2. This has got to do more with canal break than managerial problems
3. Even in chtittri the group of four people carrying on are trying their best but they are alienated in their efforts for li based agriculture. In kansara group dynamics have failed and so no meetings of WUA itself which is actually the case with all failed schemes except tiko kumbhatoli where group dynamics is ok but downward ratchet is very strong
4. Farmers claim to have got this benefit in successful schemes but most of the increment is going to consumptive uses except in saleiya where now much is being ploughed back as investment to create an upward ratchet.
5. Now cycles are becoming common and in some villages like kundubera people are thinking of motorcycles. Also many places power tillers through loans and tractors etc. Have come in.
6. Only in saleiya ambatoli not replaced but actually new pump bought and old one now kept as standby. The group sold three small pumps of meso scheme and compulsorily revolved the money amongst the wua farmers. The farmers also started a men's SHG on lines of women's SHG there and revolved its fund and generated savings as well. As soon as they had enough money they bought a new pump.
7. Increasing education / change of food patterns from marua to wheat / paddy etc. Whole some meals. Also shift to education in options other than govt. Schools / food security in terms of food availability / better clothing and dressing / better life style. More hygiene etc. / thinking about the village as a whole in term so roads / schools/ dispensary etc.
8. In some cases like khumsinghbhai of deojhari panda – definitely yes!