Impact assessment of Check dams in the Jhabua region of Madhya Pradesh

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Prepared by

Emma Fromant
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EXECUTIVE SUMMARY

Checks dams are a key aspect in watershed management that ASA have helped to implement in many areas of Madhya Pradesh. The implementation of a check dam can transform the agriculture of the surrounding areas. By holding the monsoonal rains for longer after they have stopped, new and sustained irrigation techniques can be implemented which will in turn prolong the crop growing season.

This report assesses the impact of checks dams in the Jhabua region of Madhya Pradesh, twelve dams were surveyed and research was collected through focus group discussions and house hold questionnaires conducted with the beneficiaries of the dams.

Major achievements of a check dam installation are:

- A 98% increase in the amount of land irrigated across the twelve sites surveyed.
- Increasing ground water recharge and thus increasing dug well levels and creating a reliable supplying of water to hand pumps.
- A 100% increase in farmers able to grow crops in rabi season, when previously none or very few crops could be grown.
- Due to increased productivity of the land, the value of land has increased in all areas where a dam is present. Farmers’ income has also increased due to higher production.
- Migration rate has halved, thus improving the health of beneficiaries because they can stay in one place with sufficient food.

There were a few cases in which the dams were in need of renovation, and thus were not working to full capacity but even these dams where harvesting rain water for months after it would have previously dried up. As a result all farmers interviewed could grow crops in Kharif and rabi season, and all check dams were received greatly.

ACKNOWLEDGEMENTS

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I am also thankful to Abhradeep Das for allowing the field work to take place in Jhabua. My biggest thank you to Mukesh Mewara, Raju Baghel s/o Shri Shishupal village-Kolya baida and Vesta Solanki s/o shri Suar singh village Badi sudi for transporting me to each site, translating the questionnaires and for generally being a great help.

I also extend my gratitude to all the farmers who sacrificed some of their valuable time to interact and share their experiences with me.

Finally thank you to all ASA staff for being helpful and supportive throughout the project.
1. AIM

The main purpose of this study will be to validate the impact of check dams on farmers in the Jhabua region of Madhya Pradesh. This is an important study as check dams are major water harvesting schemes that ASA implements, therefore it is necessary to gain a thorough insight into how the dams have benefited and enriched the surrounding areas. This study will assess the impacts and suggest any future improvements that can be made to the scheme.

1.1. OBJECTIVES

The objective of this study is to assess the benefits of check dams in the region of Jhabua, MP, by analysing various factors:

- Change in irrigation and water use after dam construction
- Change in agriculture pattern after the construction of dam
- The social implications of the check dam on beneficiaries, such as migration pattern, education, health and household assets
- The maintenance and management of the check dam
- Any conflicts over water use or negative impacts on the land since dam installation

2. INTRODUCTION

2.1. Introduction to ASA

ASA is a development organisation founded in 1996 by a group of specialists focusing on grass root level operations to improve the livelihood of many people in the rural areas of Madhya Pradesh. ASA aims to achieve a better quality of life for the poorest communities by teaching, training and implementing techniques and programmes that utilise the natural resources. By putting the emphasis on natural resources that are already available to the community, a sustainable lifestyle can be maintained.

ASA operates across 12 districts of Madhya Pradesh, has programmes in place in more than 800 villages and is estimated to be working with 100,000 people. The main programmes in operation include:

- Community Based Natural Resources Management;
- Participatory Irrigation Management;
- Farming Systems Research and Development; and
- Micro Finance.

2.2. ASA’s work in Jhabua

ASA has undertaken work on community based natural resources development and management in villages of Jhabua district since 1996. Jhabua is one of 50 districts in Madhya Pradesh and is
Meliwalla dam, Decacund is considered to be one of the five poorest regions of India. Rain-fed agriculture dominates in the area, and farming is predominantly subsistence, therefore water management is essential in the area to ensure the livelihood of the surrounding farmers. It has a geographic area of 6793 sq km with a population of 1.6 million, of which 91.3 percent live in rural areas. Families living below the poverty line in this area are 10 percent higher than the state average at 47 percent.

As agriculture is heavily relied upon as the main source of income in this area a drought can be devastating. ASA has implemented watershed management techniques in the region in order to improve water harvesting. With water harvesting techniques in place irrigation practices can be improved as well as the possibility of a second crop per year. One effective technique used to harvest water in Jhabua is the installation of check dams. The purpose of this paper is to assess the impact of check dams on local communities in Jhabua.

2.3. Check dam programme

In most of the semi-arid regions of India, inadequate availability of water is the most limiting factor in agricultural and rural development. Those regions receive, on average, 400mm to 1,000mm rainfall annually, which if harvested and used judiciously, could support a higher cropping intensity than the existing one (Jagawat, 2005). Therefore watershed management is essential in order to enhance land, water and agriculture productivity. Approaches to manage a watershed should encompass a holistic approach of land, water and people, with programmes implemented in order to check erosion, harvest rainwater, and improve the crop position (Seshagiri Rao, 2000).

One method of effective water harvesting is the introduction of a check dam. There are two types of check dam, one is a temporary barrier constructed of rock, mud, sandbags or other reusable products, placed across a small stream (CSQA, 2003). The second type is a permanent check dam, and is made of concrete or masonry barriers (CSQA, 2003). In this study a check dam will be defined as a permanent concrete barrier built across the direction of water flow on shallow rivers and streams, for the purpose of water harvesting for irrigation as well as for domestic and animal use (ASA, 2009).

Check dams are small scale, low cost structures. They are built across a small stream to prevent rain water from flowing away, they check the velocity of water, reduce the erosive force of water, store water in stream courses, increase groundwater recharge, and increase soil moisture conditions (Murty, 1998), thus increasing the post monsoonal flow often by months. This harvested water provides direct irrigation for the surrounding areas, through direct lift and ground water percolation (Shingi & Asopa, 2002).

Check dams are a micro-level treatment and characteristics are site specific. As they are shallow structures accumulating a body of water over a large area, water logging does not take place (ASA, 2009). Since water storage in a check dam increases percolation into the soil, it can serve to recharge...
nearby dug wells (indiawaterportal.org), this can further relieve some of the problems of water deficiency by providing additional sources of drinking, washing and cooking water as well as additional water for irrigation.

Checks dams are a key aspect in watershed management that ASA have helped to implement in many areas of Madhya Pradesh. The implementation of a check dam can transform the agriculture in the surrounding areas (ASA, 2009). By holding the monsoonal rains for longer after they have stopped, new and sustained irrigation techniques can be implemented which will in turn prolong the crop growing season (Jagawat, 2005). In addition the fertile soils due to silting can increase the area and quality of crop growth. A series of dams on one stream or river can be the best way to conserve a substantial amount of water (AKRSP, 1996).

Sometimes there is criticism over the drying up of check dams or the check dams not holding water all year round. But even if a particular dam only holds water for 2-3 months after the monsoon, such storage helps greatly in recharging the adjacent ground water, and prolonging crop growth (Jagawat, 2005).

3. METHODOLOGY

To collect qualitative and quantitative data on the overall effect of the check dam focus group discussions (FGD) and household questionnaires (HHQ) will be conducted. The data collected from the FGDs will form the main basis for the report. The information gathered from all the FGDs will be enough to form some qualitative and quantitative conclusions on the effectiveness of check dams. The FGDs will focus on the following aspects of the check dam:

- The maintenance and management of the dam
- The change in water used to irrigate nearby land, and the effect the dam has had on recharging ground water.
- How it has effected cropping patterns
- If there have been any conflicts about water use or negative effects on the land.

House hold questionnaires will also be conducted. These will add some personal depth to FGDs and will create small case studies as examples of how the check dam has benefited farmers and their families. Household surveys will focus on change in food availability, and social implications such as migration pattern, education, health and household assets.

The research was conducted from 17th-21st November. Twelve check dams were surveyed in total, this is 22% of the total amount of check dams in Jhabua, table 1 documents the location of each dam. One FGD and one to two HHQs were carried out at each dam. The sample was randomly selected from a list of dams present in Jhabua, five big dams and seven small dams were chosen.
4. RESULTS

4.1. Irrigation

The sixteen farmers interviewed in HHQs owned a total of 83 acres of land in various locations of Jhabua, in Rabi season 85% of that land is now irrigated by the water harvested in check dams. Prior to the construction of the check dam none of this land was able to be irrigated in Rabi season.

The FGDs show that before dam construction at the twelve sites surveyed only 20 acres of land was irrigated. After the dams were constructed a total of 992 acres across the twelve sites is now irrigated. That is a 98% increase in the amount of land irrigated. This irrigated land supplied by water harvesting check dams benefits as many as 207 families.

4.2. Water use and availability

100% of the dams surveyed had recorded a noticeable increase in the level of water in dug wells and the availability of water in hand pumps. A prime example is the dug wells in Chotti Sudi, these wells now have a constant water supply which is reaching over one hundred beneficiaries. This confirms that check dams increase percolation and ground water recharge.

FGDs revealed that the main use for water harvested by a check dam is for irrigation. Although all dams are frequently used for domestic use including washing, bathing, and livestock drinking water. This supply of water relieves some hardship as water supply is closer to families making it more convenient for daily tasks to be carried out.

Four big dams surveyed, Kotra, Datad II, Dotad I, and Kotra II, hold water all year round. The small dams hold water for shorter periods, but still have water available in Rabi season. Decaund, Kotrad, and Nad hold water from October to March and Kolyabeda only holds water from October to February. Also in recent year’s two dams which previously held water all year, Kadwal chotti, and Patvardi-patel, now have one to two dry months a year due to less rain and hotter summers. In all cases irrigation is possible in Rabi season thus still greatly benefiting surrounding farmers.

<table>
<thead>
<tr>
<th>Dam No.</th>
<th>Village</th>
<th>Year</th>
<th>Cost (lacs)</th>
<th>Storage capacity (mcf)</th>
<th>Irrigation area (Acre)</th>
<th>No. of H/H benf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dekakund</td>
<td>2001-02</td>
<td>3.01</td>
<td>0.30</td>
<td>2.83</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Kadwal chhoti(Bhavadia falia)</td>
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<td>1.20</td>
<td>0.25</td>
<td>2.46</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>Sudi-Chotti</td>
<td>2001-02</td>
<td>0.93</td>
<td>0.12</td>
<td>0.97</td>
<td>7</td>
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<td>4 &amp; 5</td>
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<td>0.21</td>
<td>1.24</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Kotra (Khada falia)</td>
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<td>1.00</td>
<td>15.12</td>
<td>23</td>
</tr>
<tr>
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<td>Dotad – II</td>
<td>2001-02</td>
<td>18.23</td>
<td>3.00</td>
<td>33.18</td>
<td>42</td>
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<td>8</td>
<td>Nad</td>
<td>2001-02</td>
<td>2.63</td>
<td>0.20</td>
<td>1.62</td>
<td>8</td>
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<td>9</td>
<td>Dotad – I</td>
<td>2000-01</td>
<td>16.10</td>
<td>3.00</td>
<td>58.24</td>
<td>94</td>
</tr>
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<td>10</td>
<td>Kolyabeda(Roha falia)</td>
<td>99-2000</td>
<td>0.77</td>
<td>0.25</td>
<td>1.70</td>
<td>7</td>
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<tr>
<td>11</td>
<td>Patbardi-Patel falia(Rehabilitated)</td>
<td>2000-01</td>
<td>0.40</td>
<td>0.07*</td>
<td>4.05</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>Kotra – II</td>
<td>2001-02</td>
<td>5.20</td>
<td>1.00</td>
<td>15.12</td>
<td>23</td>
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Table 1 – Sample of check dams surveyed
4.3. Agriculture

4.3.1. Crop production

Figure 1 - Kharif season – percentage increase in crop production

Figure 1 shows there was minimal change to crop production post dam construction in Kharif season. 37% of farmers had no increase in crop production and 31% had a 20-30% increase. The remaining percentage of farmers had an increase of between 30-40% increase in crop production. Despite the only a minimal increase in Kharif season there was still an increase, thus proving the benefits of a check dam.

Figure 2 - Rabi season – percentage increase in crop production

The greatest benefit to crop production is seen in Rabi season (figure 2). 94% of farmers had a 90 – 100% increase in crop production. Before the dam installation crops were unable to grow in Rabi season, water harvesting and irrigation has provided farmers with the resources to now grow crops in two seasons.
4.3.2. Crop variety

63% of farmers interviewed changed crop variety in Kharif season. A popular change in crop is to grow soya bean, this may be because it is a high cash yielding crop.

<table>
<thead>
<tr>
<th>Crop</th>
<th>number of farmers growing</th>
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<tr>
<td>soya bean</td>
<td>10</td>
</tr>
<tr>
<td>maze</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2 – New crops grown in Kharif season post dam construction.

100% of farmers interviewed changed crop variety in Rabi season, the reason being because now they can grow crops in the season when previously it was not possible.

<table>
<thead>
<tr>
<th>Crop</th>
<th>number of farmers growing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>10</td>
</tr>
<tr>
<td>Maze</td>
<td>2</td>
</tr>
<tr>
<td>Gram</td>
<td>6</td>
</tr>
<tr>
<td>Vegetables</td>
<td>3</td>
</tr>
<tr>
<td>Cotton</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3 – New crops grown in Rabi season post dam construction

63% of farmers are now growing wheat in Rabi, before the dam if the farmer was able to grow wheat it would have just been a small amount for personal consumption, but after dam construction the area and production has increased greatly thus allowing enough wheat to be grown and to be sold as well. In some cases maze and gram are now grown in Rabi season. Also three farmers interviewed have been able to grow small amounts of kitchen vegetables, such as chillies, garlic, beans, etc. for personal consumption, this would not have been possible prior to dam construction as these types of crops are great water consumers. Another crop some farmers have been experimenting with is cotton. For one farmer, Mr Budia Dungsingh, this is first year of cotton growing, he has planted 1 acre this year and if the crop is successful and he gains confidence he will increase the crop area next year.
4.4. Social impacts

4.4.1. Economic change

All farmers interviewed reported an increase in the value of their land (figure 3). The value of land has doubled or tripled for 60% of farmers, and for the remaining 40% the value of land has increased by four to five times. The land surrounding Jamba Wella dam in Chotti Sudi was worth 20000 rps per acre before the dam construction, but now post dam land is worth 60-80000 rps per acre.

![Figure 3 – Percentage of farmers that have experienced an increase in value of land post dam construction.](image)

All farmers interviewed reported an increase in income since the construction of the dam (figure 4). For 67% of farmers income has doubled or tripled, and for 33% of farmers an increase of four to five times has been reported. This increase in income is directly due to the fact that crops can be grown for two seasons instead of just one, therefore allowing more crops to be sold.

![Figure 4 - Percentage of farmers that have experienced an increase in income post dam construction.](image)
4.4.2. Migration

The number of people migrating has more than halved after dam construction (figure 5), this is because the amount of people working on the farm has doubled (figure 6). Therefore since work and income is available there is no need to seek extra work and income elsewhere. The decrease in migration has had a positive effect on the health of beneficiaries because now they have a sufficient supply of water and food, they can improve their houses and live with less suffering.

4.4.3. Education

Figure 7 – Number of males and females attending school before and after dam construction.

Figure 7 shows there is a marked improvement in the amount of males attending school prior to dam construction, however there is only a very minor change in how many females are now attending school. In both cases the total amount of children attending school compared to the size of families of the interviewed is still a relatively small amount.
4.4.4. Household assets

Figure 8 – Changes to Pakka house

Figure 8 shows that from the extra income generated from the extra crops grown, 73% of farmers were able to make small changes to their house, such as adding concrete and amending roofs. 53% of farmers were able to change their small mud huts to bigger houses made of bricks.

The interviews reveal that all farmers have livestock, but it is inconclusive as to whether this is a direct result from the construction of the dam, it is likely that ownership has increased after dam construction but it is not clear by exactly how much.

4.5. Maintenance and management

All dams surveyed have users groups, expect one dam Nad, that is in need of refurbishment. All user groups only meet when needed, for example when the gates need to be fitted or removed, they do not follow scheduled meetings. In all cases the beneficiaries said that if there was a problem with the dam the users group would be contacted to solve it. However in three cases there is need for some renovation to the dam but the beneficiaries are not being active in addressing the problems, but instead they are just waiting until the Panchayat or government do something about it. This is an example of how users groups are not working efficiently.

Before dams were built at all locations the residents of the villages were given a training session in Bitol and/or an exposure visit to Ralagum Sindhi, Maharashtra. There is evidence that the exposure visit and training directly affected the success of the dam, for example the Patbardi dam was originally constructed by the Irrigation department, but were not provided with training, the dam soon stopped working to full capacity and became in need of renovation. ASA renovated the dam and gave training and the dam has worked successfully for many years after.

There has been no record of negative effect on the surrounding land, only positive in all cases, although some dams surveyed suffer from silt accumulation within the stream, depositing behind the dam.
4.6. Conflicts

In all cases, apart from one, there has been no conflicts reported over dam usage and water is equitably distributed at all dams. It is common that the water stored in the dam is used by whoever has fields nearby, and it is distributed according to land holding and crop requirement.

There has been one case of conflict, at Kolyabeda. This involved residents from downstream of the dam damaging the concrete in the gates so that a leak would allow water to get through the dam and reach fields downstream.

5. RECOMMENDATIONS

The majority of check dams surveyed have been shown to be a great success in improving the life style of surrounding farmers. However it is necessary for dams to be surveyed on a regular basis or for user groups to be more proactive in the management of their respective dams, as a few dams showed signs of neglect and were in need of renovation. Kotolia dam in Nad, is in serious need of renovation, a large amount of siltation has occurred behind the dam, which has lead to vegetation growth and thus only a small amount of water can be held. The FGD revealed that they do not have a users group which is likely to be the reason for inefficiency of the dam. This is an example of how a dam can be of little use if not managed efficiently.

Jhikrya dagda dams in Kotrda are a series of three small dams that are also in need of renovation. The Pancayat conducted some deepening work in 2005 but siltation has taken place since and more deepening work is needed. Some concrete work is also needed on the barrier in order to break water more effectively. Despite this need for renovation work the surrounding farmers were content that it still supplied sufficient amount of water for irrigation. However in the long term these issues will need to be addressed in order to keep the dam working.

Figure 9 shows the beneficiaries suggestions and recommendations for future improvements. A popular response was for deepening work to be done or to make the dam higher in order to store more water. In most cases deepening work is not needed but beneficiaries are so impressed with the current dam they want to extend it and make them even bigger. Another request from 35% of farmers interviewed was the need for electricity. It almost all of the areas surveyed electricity is not available.
6. CASE STUDIES OF CHECK DAM BENEFICIARIES

6.1. Case study 1 – Mr Seclia Raju

Mr Seclia Raju has fields 11-50m from Cundia damra dam in Kotra. He owns three acres that are all irrigated by the dam. Prior to dam construction Seclia could only grow one maize crop a year in Kharif season. After the dam was constructed in 1999, he has been able to irrigate his land and grow crops in both Kharif and Rabi season, now growing soya bean, maize and wheat, as well as some kitchen crops for family consumption. The installation of the dam has also reduced the number of family members needing to migrate, before the dam four members would migrate from October to March, but now due to extra work to do on the farm and sufficient food can be grown only one or two members migrate and this is only for fewer months than previously. The education of his children has improved as well, before the dam none of his children attended school but now two of his daughters attend school regularly. There has been a positive impact on drinking water, with the dam recharging ground water, dug wells and hand pumps now have a supply of water all year. Finally the increase in crops production has generated a greater income allowing Seclia to purchase a motor pump for lifting water to irrigate, and four bullocks, along with one plough and one cart. He has also been able to hire a thresher when it is needed. The installation of a Cundia damra dam has helped to greatly improve Seclia’s life style.

‘Growing crops with confidence, there are no problems’
6.2. Case study 2 – Mrs Kaki Bhudi Sacadiya

Mrs Kaki Bhudi Sacadiya has fields 11 – 50m away from Umbawella Dam, in Kadwal Chotti. Before the dam crops would only grow in July – September, now the dam irrigates all of her land and crops are grown all year. Kaki Bhudi has been able to change crop variety in Kharif and can now grow wheat in Rabi season. This increase in crop production has increased the families income and has allowed them put a brick roof on the house and purchase some live stock. The amount of people migrating in the family has halved and drinking water is now readily available all year. Kaki Bhudi is another check dam success story.

6.3. Case Study 3 – Mr Budia Dungasingh

Mr Budia Dungasingh is the chairman of the watershed in Kotra, he has seven acres of land less than 10m away from Patel Wella Dam in Kotra. Before the dam Budia could only grow crops on three acres of his land and only in Kharif season. Since the construction of the dam he has been able to grow crops on all of his land, in both Kharif and Rabi seasons. He now grows soya bean, wheat, maize and a small patch of kitchen crops including chillies, garlic, ochre and beans. Also this year Budia is experimenting with a small cotton crop, if the crop is successful he will gain the confidence to increase the crop size and grow it again in future years. Migration rate within the twelve members of his family has dramatically changed, after dam construction none of his family migrates because there is more than enough food and work on his farm. Now there is no migration his children are able to attend school, and the family’s health is generally better as their life style is more comfortable and settled. In addition Budia’s income has increased by three or four times, which has allowed him to buy a large number of livestock and change his small mud hut to a much larger brick house with several rooms in side. This is a perfect example of how a check dam can dramatically change lives.
7. CONCLUSIONS

It is evident that the installations of check dams throughout Jhabua have been a great success. By harvesting monsoon rains, crop growing seasons are prolonged, ground water is recharged and drinking water is readily available, which in turn has a direct effect in enhancing the life styles of surrounding farmers.

Main achievements of check dam installation include:

- A 98% increase in the amount of land irrigated across the twelve sites surveyed.
- Prolonging the time monsoon waters are available.
- Increasing ground water recharge and thus increasing dug well levels and creating a reliable supplying of water to hand pumps.
- A 100% increase in farmers able to grow crops in Rabi season, when previously no crops could be grown in Rabi season.
- With the aid of irrigation new crop varieties have been grown, such as wheat, kitchen crops and cotton.
- Due to increased productivity of the land, the value of land has increased in all areas where a dam is present. Farmers’ income has also increased due to higher production.
- Migration rate has halved, thus improving the health and education of beneficiaries.
- 53% of farmers could improve their previous mud huts into bigger brick houses, creating a more comfortable life style.

Some of the dams surveyed are in need of some renovation. These are issues that the Users Groups should be addressing, but in most cases they are waiting for outside help to come. Although these dams are not working to maximum capacity, farmers are satisfied with them as the dams still prolong the supply of water by a few months rather than if the dam was not present at all, thus still benefiting the surrounding community. The main recommendation beneficiaries requested to enhance the dam was to heighten the dam or for deepening works to be carried out. Both processes could be ASAs next step in enhancing the livelihoods of the farming communities of Jhabua.
APENDIX

BIBLIOGRAPHY


ASA (2009). Study of workings of Check Dams in MP.


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