

Project: ANTINOMOS
Report on Indigenous Technologies

Case No: 7

Step 1 – Description

- 1. Name of Technology to be evaluated:** Virda
- 2. Location where technology is being evaluated:** Erandawali, Shah, Habib, Mamad, Nani Sadai and Vad (Distt.- Kutch)
- 3. Number of people approximately being served by the technology:** Erandawali (1200), Shah (2500), Habib (800), Mamad (1400), Nani Sadai (1000) and Vad (550) (Distt. - Kutch).
- 4. Since when it is in operation?** Approximately for more than 500 Years.
- 5. Who Designed / Planned and who implemented / constructed the technology?**
: Mr. Lal Mohmmad Khaily (60 Years), Village- Erandawali, Mr. Haji Mohmmad (63 Years), Village- Shah; Mr. Liakat Ali (53 years), Village- Habib; Mr. Ilias Hasan (48 Years), Village- Mamad; Mr. Yushuf Ramjan (30 Years), Village- Nani Sadai and Mr. Salim Ali (38 Years), Village- Vad (Distt.- Kutch)
- 6. Who is taking care of the technology now?** Villagers own.
- 7. Are there any standards available which need to be fulfilled by the technology?**
If yes which? None though wells for irrigation and drinking can be compared.
- 8. Are operations and maintenance data records available?** No.
- 9. Please provide a brief summary of the history/evolution of this technology in the selected case study:**

Viridas are traditional water harvesting systems found in the Banni area of Kutch district and in North-western Banaskantha, Sabarkantha districts and Northern parts of Gujarat. The region is characterized by arid conditions with temperatures as low as 10⁰ C in the winter and as high as 50⁰ C in the summer. It receives a mean annual rainfall of about 300 mm in short and intensive spells. Groundwater and soil are highly saline with salinity levels as high as 98000 *ppm* in Kutch area. For the purposes of this study, *Virida* from Banni areas also have been selected.

Since agriculture largely depends on monsoon, the failure of monsoon limits agricultural production and hence the livelihood options of those who depend on it.

Consequently, the ancient wisdom of constructing these man-made ponds first came up during the Kathi rule. However, not many *Virda* have been built in recent years. It is said that in some of these lakes there used to be so much water collected that in case a part of Banni suffered from drought, these *Virdas* could supply all the water needed for meeting the needs of both people and cattle.

Runoff collected in the natural depressions and artificially excavated tanks provide the pastoral-communities with water during and after the monsoon. Water stays in these tanks for a maximum period of three months. Afterwards, tanks turn dry and '*Virdas*' are the only means of providing fresh water for the rest of the period.

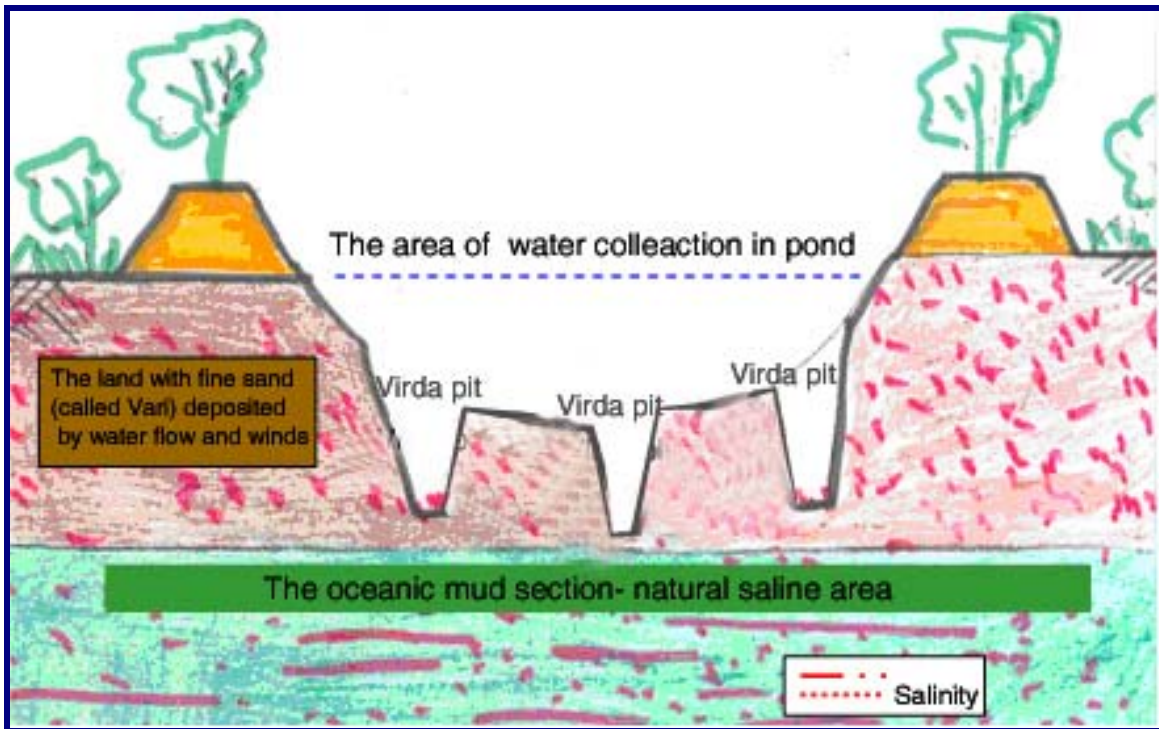
Virda is dug at the bottom of tanks. The size and the dimensions of the *Virda* depend on several factors such as soil properties, requirement, affordability of the owner etc. The diameter varies between one to two metres and the depth between four to five meters. Below this depth, the groundwater is saline in this area.

Construction of *Virda* involves digging a well till a point that is about one two meters above the saline groundwater-table. Square wooden frames tied with rope are lowered in the well and stacked one over the other in order to prevent the soil caving in. Locally available grass is inserted between the frame and the walls as well as between the frames to filter the water oozing in from the walls. A *Virda* yields fresh water for two to three months with per day yield of about 1000 litres. Later, it gradually becomes saline. People abandon the *Virda* when it becomes saline and open another *Virda* nearby. When the tanks are full during monsoon, these *Virdas* get plugged by silt and debris, but can be easily revived by clearing these.

The reason for the *Virda* to yield fresh water in the saline desert condition is that the long-standing water in the tanks actually leach away salts in the soils in and around in the tank bed while infiltrating below. During the monsoon period, these soils become free of salts and consequently, the water stored in these layers remains fresh. The fresh water in these layers feeds the *Virda* through horizontal recharge. Over a period of two to three months, the continuous draining of water from layers around and below the *Virda* and creates a temporary negative pressure. Consequently, the saline groundwater below rises and the *Virda* becomes saline.

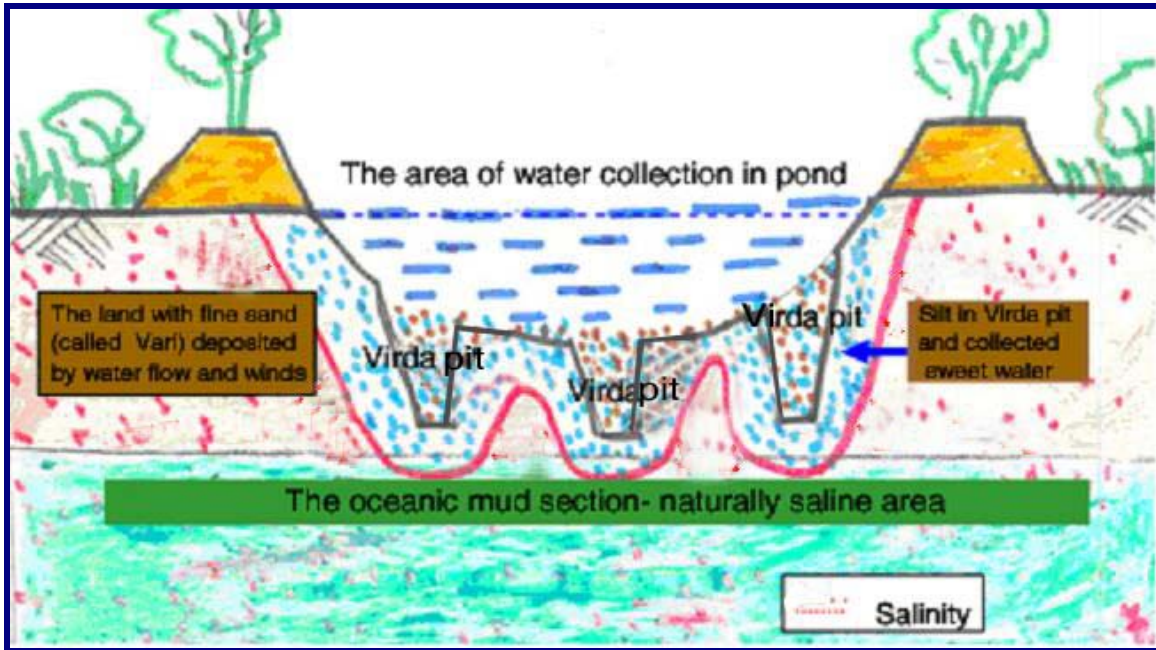
After the winter season is over, the water is used up from the lake or pond area, small 'Virda' or wells are made into the basin. The process of making them takes about two years. The description below lets us know this process in particular season and its time table as well:

Stage - First Year's winter up to summer:



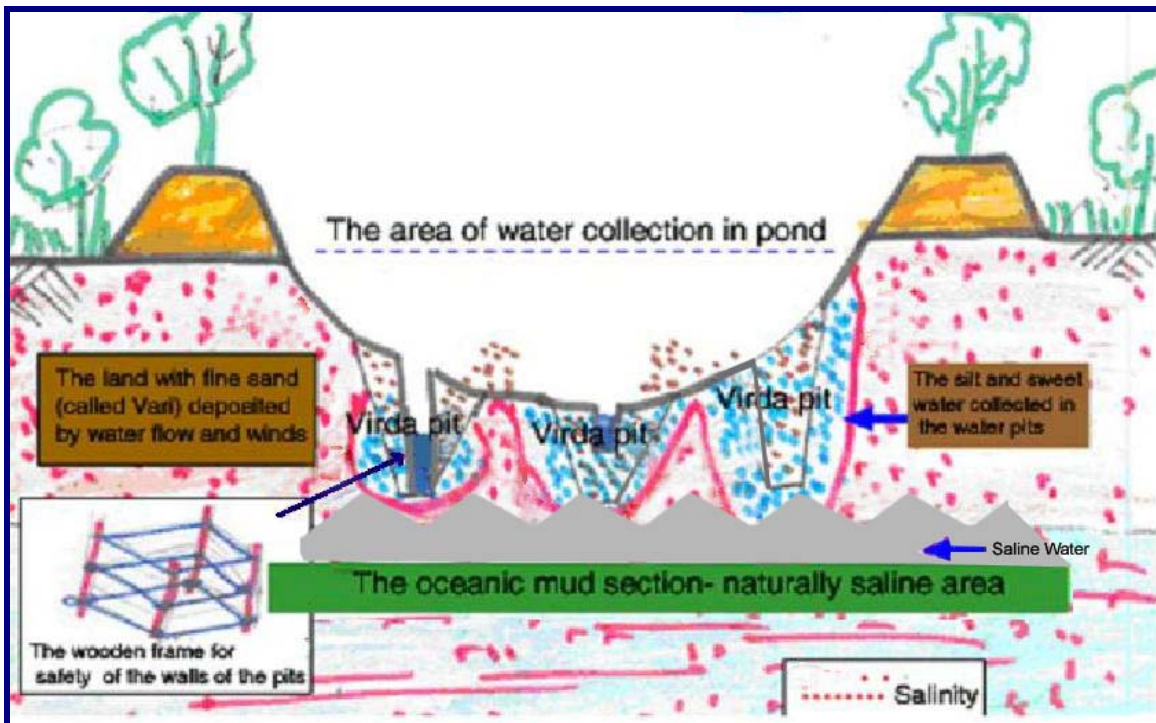
At this stage the pit is dug below the land level for collection of water. The user family, as per its number of members, dig up a well at twenty to twenty-five ft deep and a width of five to seven ft. Water is stored during rains and it could be used till the beginning of summer.

Stage – First Year’s Rains up to End of Second year’s winter:



The ponds dug for this purpose have numerous pits within its basin which are filled from the silt brought in by the rains, leaving clear water in the pond. When the people begin using this water, it can last up to the end of the winter of next year.

Stage: Second Year’s summer:



As water dries up by the end of the winter, a new 4 to 5 ft wide square pit is dug up at the beginning of the summer in the area where the pits had been dug earlier. As the pit gets deeper, a square wooden frame is put around the walls of the new pit to protect it from caving in. The pit is dug up to 2 to 3 ft deep and the water that has seeped in is then used. As and when the level of water gets deeper the process of digging and framing the walls of the pit continues. This type of pit is called 'Virda'. The water that seeps from the frame is sieved through grass frames. This process is done till the base of the *Virda* has water level of 2 to 3 ft deep only.

The *Virda* thus prepared can provide enough water to a small settlement along with their cattle for three months. In case the water dries up in the *Virda* or turns saline, another *Virda* is dug up in the same lake basin. Thus the number of *Virdas* may be such that in case the rains come late after next summer at least till the second month of the Rainy season, the water is available for the users.

Stage: From second Rainy Season to third year's winter and summer:

As we have seen in the earlier stage, if the rains are normal in the next year, the people get water from the tanks. Or, dig up additional pits in the lakes (*Virda*) to get the water. In case of even lesser rain by the end of the season, again the lake is filled up with the rainwater. That year's water thus once again becomes the source of water up to the winter and summer of the third year.

Stage: The Rains of Third Year:

However, if the rains are inadequate or absent, the water becomes scarce by the end of rainy season. At such times, the people begin to migrate to the areas with natural pits and ponds, such as Shah, Habib and Mamad areas. These sources would supply water till the beginning of summer or winter for that year. Then the people here are compelled to migrate out once again.

Thus the sources of water, natural and made by local population in keeping with the cycles of seasons in the area and managed accordingly, are able to contain the adverse effects of a famine to a big extent.







Step 2 – Evaluation

Date of visit: October 17th to October 20th, 2008.

Name of the expert(s) making the visit: Dr Suboodh Kumar Bishnoi

1. Preliminary performance indicators for accessing whether the intended direct benefits have been fulfilled:


Intended Benefit	Indicator	Method of Verification
Collection and storage of ground water from an arid, saline area for drinking and irrigation purposes.		
Technical functioning	Performance in more than last 500 years	Experts visit
Acceptance by local community		


Unintended Benefit	Indicator	Method of verification
Family health improvement	Due to good quality sweet drinking water	


2. Results of Assessment:

Intended Benefit	Indicator	Fulfilled Yes/no	Comments (with reference to the used indicators)
Drinking water		Yes	
Technical functioning	Yes		System is working well but has started requiring timely maintenance and so is getting costlier.
Acceptance by the local community	Yes		Users are mainly satisfied with the system and consider it a success.
Water conservation		Yes	

Comments from the local peoples:

User Group	Results/ Comments
<p>1. a. Mr. Lal Mohmmad Khaily (60 Years),</p>  <p>Village- Erandawali, Distt.- Kutch</p>	<p>There is more quantity of water as compared to the previous years. A very good <i>shujh</i> (wisdom) of our ancestors for which we are grateful to them. To keep it in working condition, the wooden planks are used to make the well strong. ‘<i>Ghaas</i>’ (grass) are changed for proper filter.</p>
<p>b. Mr. Salem Mohhmad Khaily (43 Years), Village- Erandawali, Distt.- Kutch</p>	<p>In such a saline area, it was and is still a boon for all of us due to which we could get such sweet water in spite of so much salinity in the land. It was because of our ancestors that we could have access to water before the reaching of water supply. Therefore, I think we should revive these or some other traditional structures for the sake of coming generations. There is a difference in the way the wells are dug in the lakes. Machine is used to pump the water out. Concrete/finished <i>hawalas</i> (tank) are used now–a-days.</p>
<p>2 (a). Mr. Haji Mohmmad (63 Years), Village- Shah, Distt.- Kutch</p>	<p>An excellent example of traditional water harvesting structure. Due to <i>Virdas</i>, all the villagers got good quality water in the time of need. The wells are segregated acc. to the families. This helps in sending the <i>dhor</i> (cattle) to the respective place for drinking water from own <i>hawalas</i> (tank). The old <i>Havalas</i> (tank) were of clay but the present are finished/ concrete. The previous were better.</p>
<p>(b). Mr. Habib Bhungus (63 Years), Village- Shah, Distt.- Kutch</p>	<p><i>Virdas</i> have been an excellent source of water for us even after monsoon. We got not only adequate water but fresh water both for our drinking purpose as well as for cattle’s also. Although now, we have incorporated many changes in this ancient technology.</p>

	<p>The wells dug in the lakes have some changes from the pervious ones. Instead of using rubber vessel or buckets the water is pumped with a machine. Wood is used to make the base to the top of the wells for stopping the soil falling in the well because of seepage.</p> <p>Few peoples used JCB machine for digging the wells.</p>
<p>(c). Mr. Suleman Haider (54 Years), Village- Shah, Distt.- Kutch</p>	<p>Although it is proving expensive sometimes, but it also proves the utility of traditional water harvesting structures which are useful in very arid and saline area like our village. It has been fulfilling our water requirements for a long time particularly in the dry months. The wooden wells in the lakes are for sweet water. But we have to face a no. of hurdles like the maintenance and availability of good quality wood. There is problem of expenses in the present system.</p>
<p>3 (a). Mr. Liakat Ali (53 years), Village- Habib, Distt.- Kutch</p>	<p>We cannot imagine how we would have coped in such challenging weather and soil conditions without Virdas before the coming of water supply. I would even say that we like the taste of virda water rather than that of water supply. Besides, as compared to previous years the water in the wells is sweeter and brown colored. The wooden planks are replaced every year for a better quality of water. Grass needs to be changed every 15-20 days.</p>
<p>(b). Mr. Imran Ali (39 Years),</p>  <p>Village- Habib, Distt.- Kutch</p>	<p>It is an excellent ancient technology which is still working properly and catering to our water requirements. The old wells are still giving good water both for us as well as our cattle. Although, problems are coming up related to digging, maintenance and availability of grass and wooden planks. We need the help of government or some organization for the same.</p>

<p>4. Mr. Ilias Hasan (48 Years), Village- Mamad, Distt.- Kutch</p>	<p>We are very satisfied with this technology. It still provides us with adequate water. Lakes have been dug 4-5 meters deep for wells. More quantity of water is available throughout the day; 250-2500 buckets of water is collected in a day from the well. New wood is used every year and the planks at the base are tightened with the help of nut bolts. Instead of grass ropes the cotton or plastic ropes are used.</p>
<p>5 (a). Mr. Yushuf Ramjan (30 Years),</p>  <p>Village- Nani Sadai, Distt.- Kutch 094277 62966</p>	<p>Virdas have proved to be lifeline for us in the past but we require help now for saving these wells. The wells in the lakes as per the old system are still good, but we need to dig them every year. If we want to save them then we should concretize them with RCC. In the last 5-8 years our wells have been filled with soil. Extracting it encumbers huge losses. Digging till 3 ft can be the solution. The water of our lake is very sweet. Its banks have given way but they can be renovated. The wooden planks have to be repaired. The present wells have water till 10 feet deep. Well-constructed and well-maintained wells give water up to 2500 lt. Every 8-10 days soil needs to be dug out from the well for getting better water. The water of <i>Havala</i> (tank) is good and boosts the health of the cattle. The quality of milk is also good. We need help for saving the wells and thus saving people and cattle.</p>
<p>(b). Mr. Zameel Ahmed (40 Years),</p>	<p>Virdas have saved the cattle and crops from dying out.</p>


Village- Nani Sadai, Distt.- Kutch	<p>What more can we say --instead of <i>kacha</i> (made of mud) houses now we construct concrete cement houses? It has been possible due to Virdas. They have provided for more water for men as well as cattle.</p> <p>Machines are used for digging to prevent mud-slide so that, clean water is available. With machines in use, there is no need of two people pulling out water.</p>
(c). Mr. Zaheer Shah (53 Years), Village- Nani Sadai, Distt.- Kutch	<p>We have used wooden planks as supporting structures in the wells. We get sweet water and that is also stored in the <i>adala/ havala</i> (tank) for cattle to drink.</p> <p>New planks strengthen the wells and new grass filters the water. <i>Adalas</i> (tank) were kept <i>kacha</i> (unfinished) in olden days as per the tradition. But in some places there are now concrete <i>adalas</i> (tank) also. Machines have reduced the need of much human labor.</p>
6. Mr. Salim Ali (38 Years), Village- Vad, Distt.- Kutch	<p>Such wells have water in more quantities. If silt can be prevented from entering the wells every year then they will be well-maintained & water will be sweet.</p>

Summary of User Perceptions

Both Individual Interviews and group Discussions

Questions (Q):

S. No.	User Name	Questions	Results/ Comments
1 (a).	Mr. Lal Mohmmad Khaily (60 Years),	Q1: Are You Happy with the technology? IF Yes why, if no why not?	There is more quantity of water as compared to the previous years. A very good <i>shujh</i> (wisdom) of our ancestors for which we are grateful to them.

	 <p>Village- Erاندawali, Distt.- Kutch</p>	<p>Q2: Are you using the technology (regularly)?</p> <p>Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?</p> <p>Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?</p> <p>Q5: Do you have equal access?</p> <p>Q6: Are you aware of any misuse of the service?</p>	<p>Yes</p> <p>No</p> <p>To keep it in working condition, the wooden planks are used make the well strong. 'Ghaas' (grass) are changed for proper filter.</p> <p>Yes. Mostly, each family has their own Virda.</p> <p>No</p>
b.	<p>Mr. Salem Mohhmad Khaily (43 Years), Village- Erاندawali, Distt.- Kutch</p>	<p>Q1: Are You Happy with the technology? IF Yes why, if no why not?</p>	<p>Yes, it has proved very beneficial. In such a saline area, it was and is still a boon for all of us due to which we could get such sweet water in spite of so much salinity in the land. It was because of our ancestors that we could have access to water before the reaching of water supply. Therefore, I think we should revive these or some other traditional structures for the sake of coming</p>


			generations.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	No
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	There is a difference in the way the wells are dug in the lakes. Machine is used to pump the water out. Concrete/finished <i>hawalas</i> (tank) are used now days.
		Q5: Do you have equal access?	Yes, mostly each family has their own but sometimes they use other's.
		Q6: Are you aware of any misuse of the service?	No
2 (a).	Mr. Haji Mohmmad (63 Years), Village- Shah, Distt.- Kutch	Q1: Are You Happy with the technology? IF Yes why, if no why not?	Yes, we are very happy with the results. It is an excellent example of traditional water harvesting structure. Due to <i>Virdas</i> , all the villagers got good quality water in the time of need. This helps in sending the <i>dhor</i> (cattle) to the respective place for drinking water


			from own <i>hawalas</i> (tank).
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	No
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	The old <i>Hawalas</i> (tank) were of clay but the present are finished/ concrete. The previous were better.
		Q5: Do you have equal access?	Yes. The wells are allotted according to the family's size.
		Q6: Are you aware of any misuse of the service?	No
(b).	Mr. Habib Bhungus (63 Years), Village- Shah, Distt.- Kutch	Q1: Are You Happy with the technology? IF Yes why, if no why not?	Yes, we are happy. <i>Virdas</i> have been an excellent source of water for us even after monsoon. We got not only adequate water but fresh water; both for our drinking purpose as well as for cattle's also.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes	No

		what?	
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	<p>We have incorporated many changes in this ancient technology : –</p> <p>The wells dug in the lakes have some changes from the pervious ones. Instead of using rubber vessel or buckets the water is pumped with a machine. Wood is used to support the structure of the Virda and prevent its collapse due to seepage. Soil is porous and loose due to high salinity in the region.</p> <p>Few people used JCB machine for digging the wells.</p>
		Q5: Do you have equal access?	Yes
		Q6: Are you aware of any misuse of the service?	No
(c).	Mr. Suleman Haider (54 Years), Village- Shah, Distt.- Kutch	Q1: Are You Happy with the technology? IF Yes why, if no why not?	Yes, it is a good technology. Although it is proving expensive sometimes, but it also proves the utility of traditional water harvesting structures which are useful in very arid and saline

			area like our village. It has been fulfilling our water requirements for a long time particularly in the dry months. The wooden wells in the lakes are for sweet water.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	It is becoming more expensive. If Govt. could divert some funds, it will become easier for us.
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	We have to face a no. of hurdles like the maintenance and availability of good quality wood. There is problem of expenses in the present system.
		Q5: Do you have equal access?	Yes
		Q6: Are you aware of any misuse of the service?	No
3 (a).	Mr. Liakat Ali (53 years), Village- Habib, Distt.- Kutch	Q1: Are You Happy with the technology? IF Yes why, if no why not?	Yes, definitely a useful structure. We cannot imagine how we would have coped in such challenging weather and soil conditions without Virdas before the coming of water

			<p>supply. I would even say that many people find the taste of virda water better than that of water supply.</p> <p>Besides, as compared to previous years the water in the wells is sweeter and brown colored.</p>
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	Only, these require maintenance.
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	The wooden planks are replaced every year for a better quality of water. Grass needs to be changed every 15-20 days.
		Q5: Do you have equal access?	Yes
		Q6: Are you aware of any misuse of the service?	No.
(b).	Mr. Imran Ali (39 Years),	Q1: Are You Happy with the technology? IF Yes why, if no why not?	It is an excellent ancient technology which is still working properly and catering to our water requirements. The old wells are still giving good

	 <p>Village- Habib, Distt.- Kutch</p>		water for us and for our cattle.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	Problems are coming up related to digging, maintenance and availability of grass and wooden planks.
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	We need the help of government or some organization for the same.
		Q5: Do you have equal access?	Yes
		Q6: Are you aware of any misuse of the service?	No.
4.	Mr. Ilias Hasan (48 Years), Village- Mamad, Distt.- Kutch	Q1: Are You Happy with the technology? If Yes why, if no why not?	We are very satisfied with this technology. It still provides us with adequate water. Lakes have been dug 4-5 meters deep for wells. There is more quantity of water and for 24 hrs.250-2500 buckets of water is collected in a day from the well.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if	No

		yes what?	
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	New wood is used every year and the planks at the base are tightened with the help of nut bolts. Instead of grass ropes the cotton or plastic ropes are used.
		Q5: Do you have equal access?	Yes.
		Q6: Are you aware of any misuse of the service?	No.
5 (a).	<p>Mr. Yushuf Ramjan (30 Years),</p>  <p>Village- Nani Sadai, Distt.- Kutch 094277 62966</p>	Q1: Are You Happy with the technology? If Yes why, if no why not?	<p>Virdas have proved to be lifeline for us in the past but we require help now for saving these wells. The present wells have waters till 10 feet deep. Well-constructed and a well-maintained wells give water up to 2500 lt. The water of <i>Havala</i> (tank) is good and boosts the health of the cattle. The quality of milk is also good.</p>
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	It is getting expensive to maintain them.
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	The wells in the lakes as per the old system are still good, but we need to dig them every year. If we want to save them then we should concretize them with RCC. In the last 5-8 years our wells have been filled with soil. Extracting it encumbers huge losses. Digging till 3 ft can be the

			<p>solution.</p> <p>The water of our lake is very sweet. Its banks have given way but they can be renovated.</p> <p>The wooden planks that have given way are to be repaired. Every 8-10 days soil needs to be digging out from the well for getting better water. We need help for saving the wells and thus saving people and cattle.</p>
		Q5: Do you have equal access?	Yes
		Q6: Are you aware of any misuse of the service?	No.
(b).	Mr. Zameel Ahmed (40 Years), Village- Nani Sadai, Distt.- Kutch	Q1: Are You Happy with the technology? If Yes why, if no why not?	Virdas have saved the cattle and crops from dying out. What more can we say --instead of <i>kacha</i> (made of mud) houses now we construct concrete cement houses. It has been possible due to Virdas. They have provided for more water for men as well as cattle.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	No.
		Q4: Is there anything which	Machines are used for

		you may not like with the technology or which could be improved (if yes, what and how)?	digging to prevent mud-slide and clear water. With machines in use there is no need of two people pulling out water.
		Q5: Do you have equal access?	Yes
		Q6: Are you aware of any misuse of the service?	No.
(c).	Mr. Zaheer Shah (53 Years), Village- Nani Sadai, Distt.- Kutch	Q1: Are You Happy with the technology? If Yes why, if no why not?	Yes, they have changed the scenario of these villages. For better rains we have used wooden planks in the wells. We get sweet water and that is also stored in the <i>adala / havala</i> (tank) for cattle to drink. New planks strengthen the wells and new grass filters the water. <i>Adalas</i> (tank) were kept <i>kacha</i> (unfinished) in olden days as per the tradition. But in some places there are now concrete <i>adals</i> (tank) also. Machines have reduced the need of much human labor.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	They need to be properly and timely maintained.
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and	No

		how)?	
		Q5: Do you have equal access and pay a fair price?	Yes
		Q6: Are you aware of any misuse of the service?	No.
6.	Mr. Salim Ali (38 Years), Village- Vad, Distt.- Kutch	Q1: Are You Happy with the technology? If Yes why, if no why not?	Such wells have water in more quantities.
		Q2: Are you using the technology (regularly)?	Yes
		Q3: Is there anything which may prevent you from using the technology (regularly), if yes what?	No
		Q4: Is there anything which you may not like with the technology or which could be improved (if yes, what and how)?	If silt can be prevented from entering the wells every year then they will be well-maintained & water will be sweet.
		Q5: Do you have equal access?	Yes
		Q6: Are you aware of any misuse of the service?	No.