NATURAL RESOURCE CONSERVATION PLAN

FOR RISKAN WATERSHED

JANUARY 1994

PAN HIMALAYAN GRASSROOTS DEVELOPMENT FOUNDATION
POST BAG # 3, RANIKHET 263 645
ALMORA DISTRICT, KUMAON

PEOPLE HAVE LONG BEEN CONVINCED THAT WITH BULLDOZERS AND CONCRETE WE CAN CONTROL WATER AND ADAPT IT TO OUR WAYS. WE HAVE CHANGED WATER TO OUR BENEFIT IN MANY CASES, BUT WE HAVE ALSO MESSED IT UP. THE CHANGES HAVE OFTEN BEEN DRASTIC. WE'VE TURNED RIVERS INTO LAKES, DESERTS INTO ALFALFA FIELDS, AQUIFERS INTO WASTE DUMPS. WE'VE EVEN CHANGED THE CHEMISTRY OF RAIN. IT'S NOT JUST A CRISIS; WE'VE UNDERMINED THE FOUNDATION OF LIFE.

YET THE HYDROLOGICAL CYCLE IS, ULTIMATELY, A SYSTEM OF REBIRTH - THE SUN BLAZES, THUNDER ROARS, AND WATER COMES AROUND AGAIN. HUMAN BEINGS, TOO, COME AROUND TO NEW IDEAS, NEW UNDERSTANDING, NEW HOPE.

Michael Parfit in National Geographic, November 1993

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INTRODUCTION

During October 1993 the following documents had been prepared for the Programme Support Unit of the Indo-Dutch Cooperation :

Appraisal of Water Resources in selected Villages Within the Proposed Dronagiri Water Supply Scheme In Dwarahat Block, Almora District, Kumaon

Appropriate Technology Applications & Ecorestoration Through Small Village Groups in selected micro catchments within the proposed Dronagiri Water Supply Scheme - A Pilot Programme Proposal

Discussions based on these two documents underlined the need to initiate a programme spread over an entire drainage basin instead of a few selected villages.

Of the four significant drainage basins - Dusad, Khirau, Riskan and Khor - which form a part of the Gagas sub watershed it was decided to focus on Riskan as the majority of the villages listed under SP VII are located within it.

Of these four drainage basins, the Riskan is the longest stream. Originating from the roots of the old Nagarjhun temple north-west of Dwarahat town, the Riskan flows down to the ancient Bhimandeswar temple, runs through a small valley and finally narrows down into the Gagas river at the Silor Mahadev temple. In the course of streaming down from Nagarjhun to Silor Mahadev, over a hundred tiny tributaries define the fifty odd kilometers of the Riskan stream.

There are 51 villages and toks within the Riskan watershed. Of these, five settlements - Kaunla, Diari, Salalkhola, Bamanpuri and Jamankirola - are being excluded from the purview of this document due to its close proximity with Dwarahat town. The remaining **46 villages and toks** have been surveyed during **December 1993.**

The biotic pressure is immense and could be gauged from the fact that there are over **9000 people and close to 6000 domestic animals** who subsist on **1450 hectares of croplands and a little over 2000 hectares of common support area.**

The carrying capacity of the natural resource base of Riskan has been stretched much beyond the limits of conservation principles and it would only be in order to initiate a comprehensive ecorestoration programme. Which would enable the people of this watershed to improve the quality of their lives and, hopefully, also demonstrate the feasibility of similar grassroots development efforts in the adjoining drainage basins of the Gagas sub watershed.

VILLAGES & PEOPLE IN RISKAN

	Village	Gram Sabha	Households	People
1.	Chamni	Chamni	56	305
2.	Kunsiari	Kunsiari	83	425
3.	Painauli tok	Tipola	13	82
4.	Baskania tok	Tipola	11	43
5.	Khalna	Khalna	71	438
6.	Silang tok	Asgoli	5	46
7.	Raun tok	Asgoli	16	96
8.	Patal tok	Asgoli	17	95
9.	Gubtali	Gubtali	25	145
10.	Dhura tok	Paithani	4	26
11.	Paithani	Paithani	72	316
12.	Nauri tok	Paithani	10	81
13.	Naini	Naini	49	164
14.	Nainoli	Naini	11	72
15.	Sumwali	Paithani	12	65
16.	Simalgaon	Simalgaon	28	145
17.	Bitholi Talli	Bitholi Talli	20	86
18.	Taya tok	Bitholi Talli	11	42
19.	Jhola tok	Bitholi Talli	3	23
20.	Mohani tok	Bitholi Talli	16	69
21.	Bedholi	Bedholi	50	336
22.	Banoli	Banoli	23	127
23.	Bari	Banoli	37	181
24.	Kahali Malli	Kui	29	143
25.	Mainoli	Kui	42	175
26.	Kui	Kui	47	211
27.	Kahali Talli	Kahali Talli	86	317
28.	Rana	Rana	39	179
29.	Kora	Rana	18	81
30.	Dhargaon	Rana	14	76
31.	Gawar	Gawar	144	736
32.	Kotila	Kotila	83	387
33.	Bhumkia	Bhumkia	45	256
34.	Bayala	Bayala	28	117
35.	Dabhar	Bayala	14	93
36.	Bagjewala	Bayala	33	197
37.	Tumri	Bayala	16	90
38.	Thamar tok	Bayala	5	31
39.	Phalduri	Phalduri	41	221
40.	Nar	Phalduri	25	160
41.	Masnaula tok	Phalduri	16	55
42.	Khagreti tok	Phalduri	14	85
43.	Walna	Walna	52	299
44.	Kande	Kande	109	601
45.	Bitholi Malli	Bitholi Malli	124	589
46.	Ganoli	Ganoli	113	570
			1780	9077

DOMESTIC ANIMALS IN RISKAN

	Village	Cattle	Bullocks	Goats	Total
1.	Chamni	109	69	137	247
2.	Kunsiari	162	78	82	281
3.	Painauli tok	34	11	-	45
4.	Baskania tok	22	3	-	25
5.	Khalna	184	109	111	349
6.	Silang tok	21	8[1]	18	38
7.	Paithani	125	52	64	209
8.	Nauri tok	29	19	5	51
9.	Naini	107	24	63	163
10.	Nainoli	17	17	34	51
11.	Simalgaon	60	42	11	108
12.	Bitholi Talli	57	26	9	88
13.	Taya tok	35	14	-	49
14.	Jhola tok	12	2	2	15
15.	Mohani tok	36	10	-	46
16.	Bedholi	140	67	15	215
17.	Banoli	65	35	5	103
18.	Bari	91	34	40	145
19.	Kahali Malli	69	31	25	113
20.	Mainoli	132	58	41	211
21.	Kui	98	14	4	113
22.	Rana	79	26	-	105
23.	Dhargaon	21	6	2	28
24.	Gawar	289	124	10	418
25.	Bhumkia	70	52	16	130
26.	Bayala	122	19	-	141
27.	Dabhar	43	15	-	58
28.	Bagjewala	70	28	4	100
29.	Tumri	50	32	61	113
30.	Thamar	29	12	30	56
31.	Phalduri	123	40	16	171
32.	Nar	55	22	3	79
33.	Masnaula	52	10	-	62
34.	Khagreti	49	8	-	57
35.	Walna	138	47	39	205
36.	Kande	291	104	52	421
37.	Bitholi Malli	225	132	92	403
38.	Ganoli	223	103	139	395
		3534	**1505**	**1130**	**5607**

1. Two goats have been taken as one cattle unit
2. Data collected through cent percent household survey during December 1993

RATIO OF CROPLANDS VIS-A-VIS COMMONS

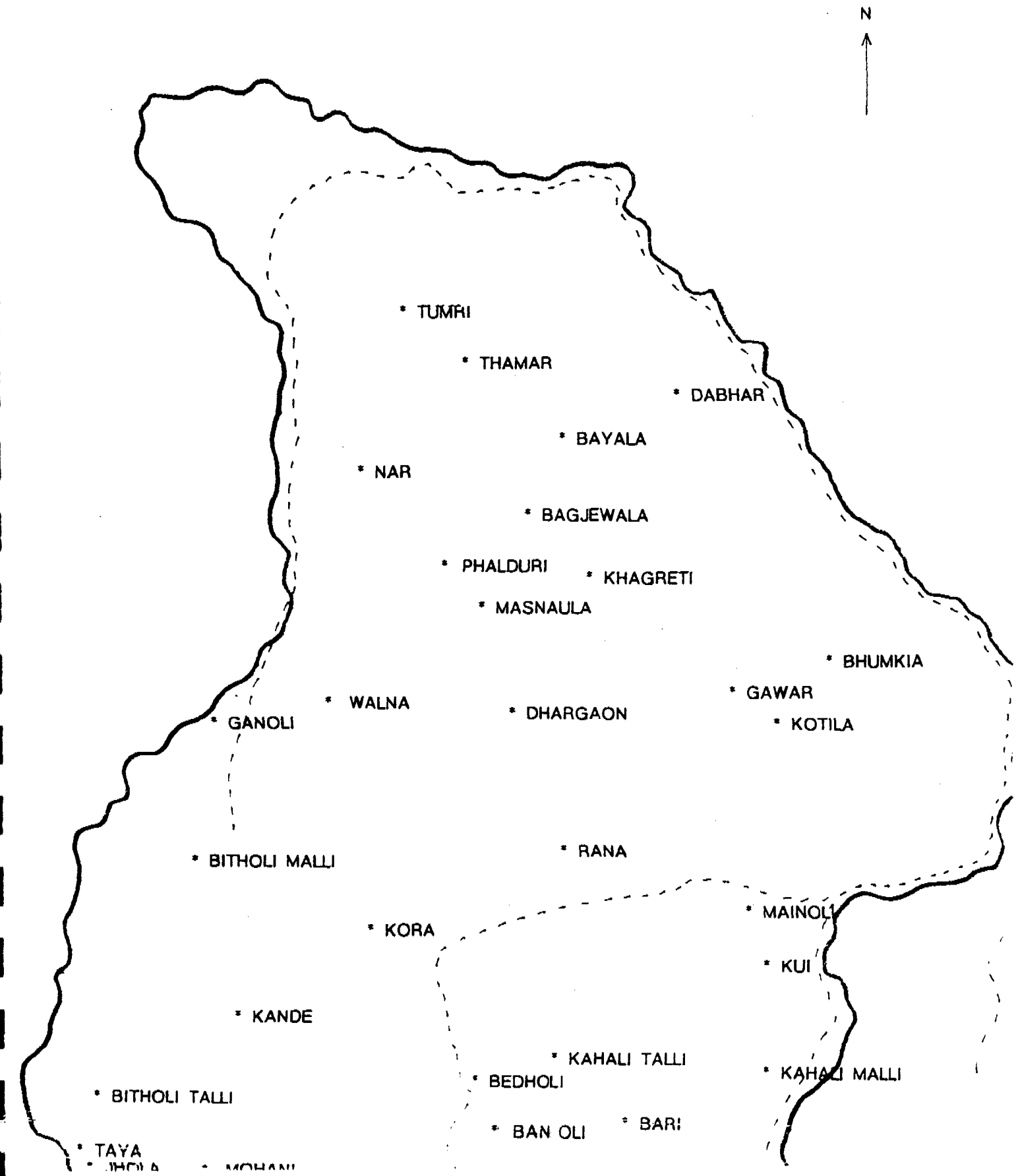
Hectares

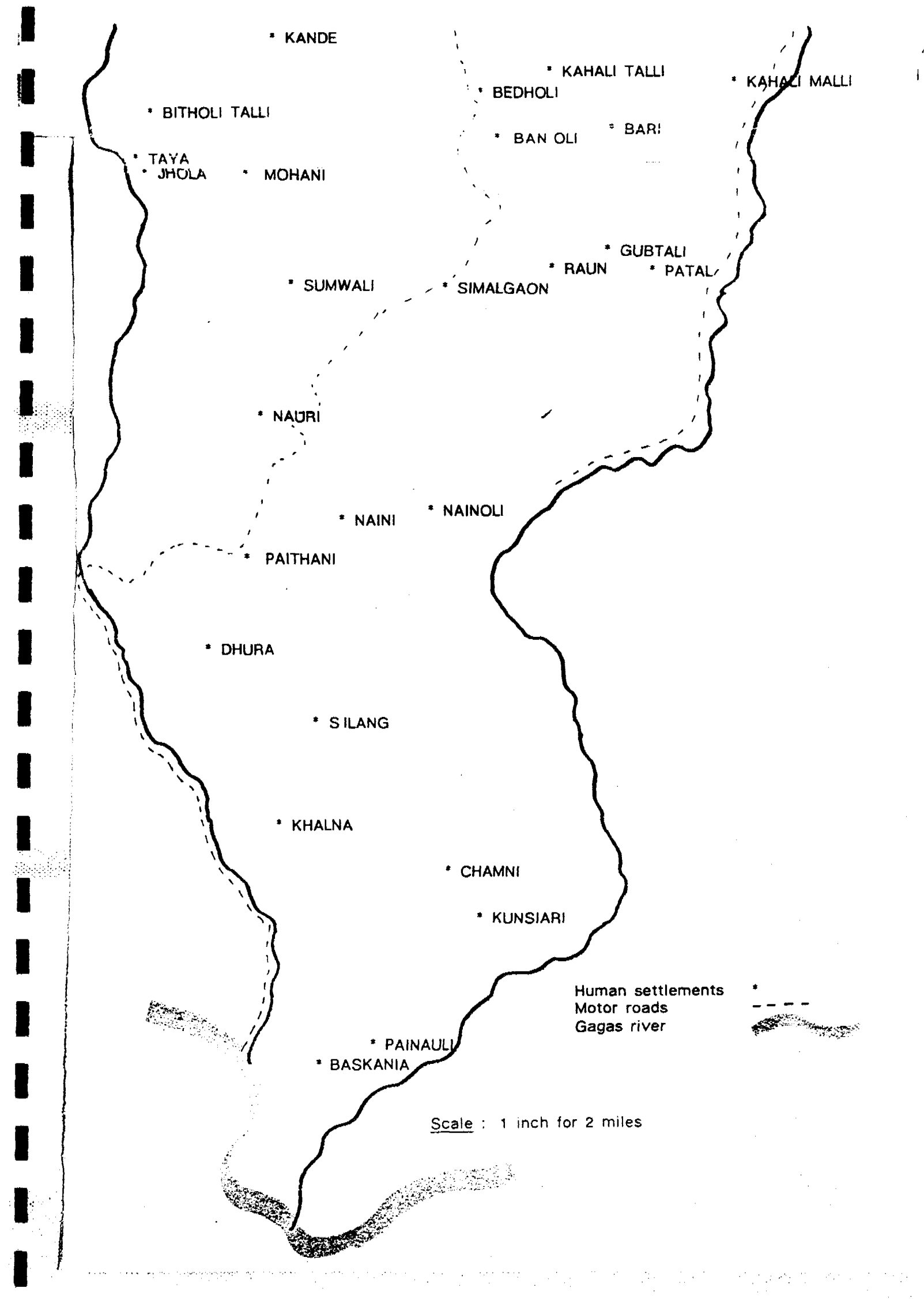
	Village	Croplands	Commons	Ratio
1.	Chamni	55	112	1 : 2
2.	Kunsiari	111	56	1 : 0.5
3.	Painauli	32	1	1 : nil
4.	Baskania	22	14	1 : 0.6
5.	Khalna	51	83	1 : 1.6
6.	Paithani	61	260	1 : 4
7.	Naini	43	70	1 : 2
8.	Sumwali	29	53	1 : 2
9.	Bitholi Talli	42	83	1 : 2
10.	Simalgaon	43	100	1 : 2
11.	Bedholi	27	10	1 : 0.4
12.	Banoli	82	29	1 : 0.4
13.	Gubtali	19	12	1 : 0.6
14.	Raun-Patal	71	42	1 : 0.6
15.	Kahali Talli	60	96	1 : 2
16.	Mainoli	36	53	1 : 1.5
17.	Kahali Malli	67	14	1 : 0.2
18.	Rana	40	38	1 : 1
19.	Dhargaon	9	28	1 : 3
20.	Gawar	14	160	1 : 11
21.	Kotila	5	23	1 : 5
22.	Bhumkia	15	9	1 : 0.6
23.	Bayala	67	177	1 : 2.6
24.	Dabhar	4	3	1 : 1
25.	Tumri	10	7	1 : 0.7
26.	Nar	27	248	1 : 9
27.	Phalduri	47	46	1 : 1
28.	Walna	92	145	1 : 1.6
29.	Kande	85	205	1 : 2
30.	Bitholi Malli	91	100	1 : 1
31.	Ganoli	93	99	1 : 1
		1450	**2376**	**1 : 1.6**

NOTE

1. **Commons** denote the total of van panchayat and civil benap lands adjoining the village.
2. **Ideally,** the ratio of croplands vis-a-vis commons ought to be 1 : 7 for sustainability. In Riskan, the situation is alarming with a poor ratio, and aggravated even further with very high incidence of degradation of the commons.

LOCATION MAP OF RISKAN WATERSHED




KANDE
KAHALI TALLI
KAHALI MALLI
BEDHOLI
BITHOLI TALLI
BARI
BAN OLI
TAYA
JHOLA
MOHANI
GUBTALI
RAUN
PATAL
SUMWALI
SIMALGAON
NAURI
NAINI
NAINOLI
PAITHANI
DHURA
SILANG
KHALNA
CHAMNI
KUNSIARI
Human settlements
Motor roads
Gagas river
PAINAULI
BASKANIA
Scale : 1 inch for 2 miles

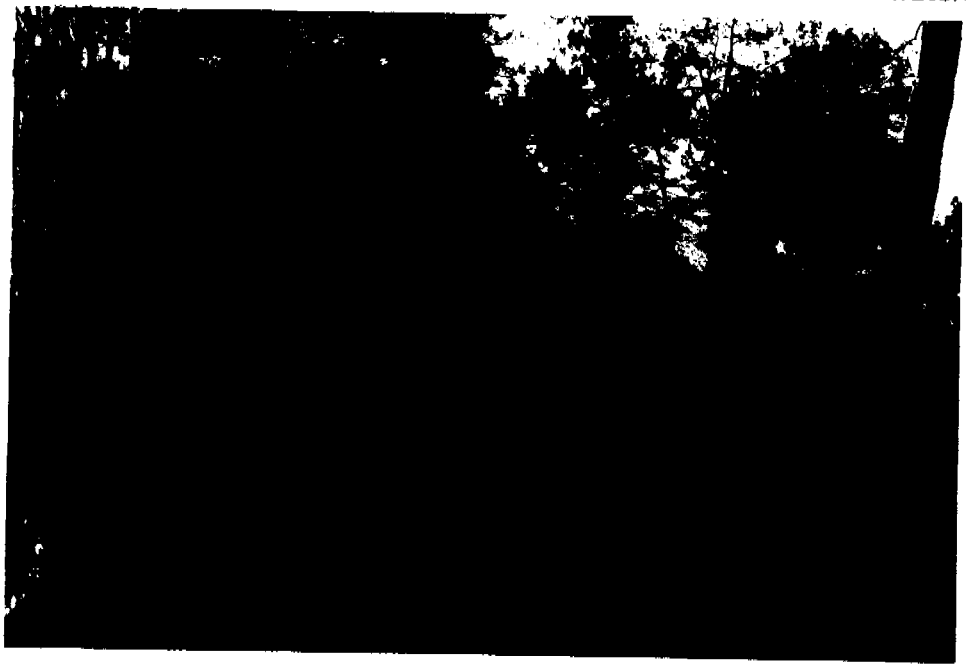
The Riskan at Paithani.....did it run deep and strong?

Imagine just a decade ago when every village utilised the overflow of the primary water resources for irrigating their fields and even then hundreds of tiny tributaries flowed down to Riskan

Denudation of forests, drying-up of fragile primary water resources like naulas and a basic change in peoples attitude from one of caring to chasing a tinsel rainbow are all parts of the current Riskan jigsaw

Most villages in this watershed are stripped of forest cover right upto the ridges ... Kahali Talli (top) Phalduri (below)

The entire catchment of Riskan between Paithani and Chamni stretches through wasted lands and ironically the best of forest cover is defined by worthless stands of over-exploited pines...the natural regeneration also does not hold much water for the future of soil and moisture conservation in this watershed



Chamni is the last village, located at the mouth of Riskan, with large tracts of denuded hillslopes. Surface runoff is so severe that during the last monsoon, flash floods in a tributary originating therein drowned a young lad close to its confluence with Riskan below.

There are just a couple of water-mills functioning along the entire course of Riskan today...this by itself is a reflection of the changing patterns...increased monsoonal runoffs and very severe decreases in the rate of moisture absorption These water-mills are capable of functioning only for a few months each year due to drastic reduction in the flow of Riskan stream by spring

The dis-appearance of water-mills and freshly pounded flour has created social problems not only for the families who traditionally operated such mills and bartered grains in exchange, but also added an extra chore for the women, who need to walk longer distances to noisy mechanised flour mills
The food-value attached to traditional water-mills is a seperate matter

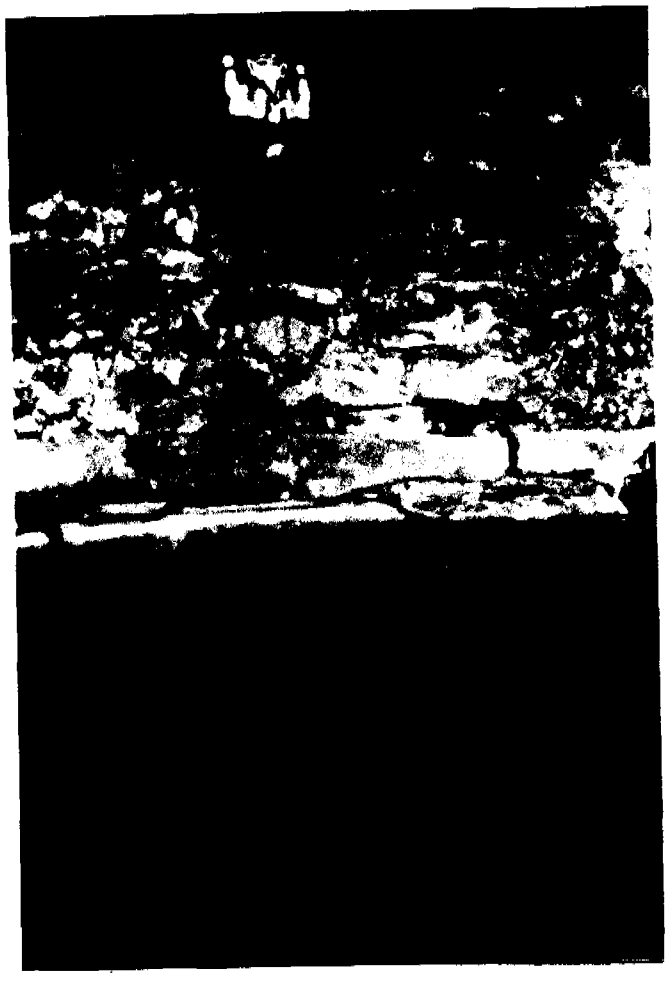
STATUS OF WATER SUPPLY SCHEMES

According to the recent survey of all the forty six villages and toks within the Riskan, the status of water supply schemes could be summarised as follows:

Functional	Non-functional	Under construction	No schemes
1. Kunsiari	25. Chamni	37. Kahali Malli	41. Silang
2. Painauli	26. Dhura	38. Mainoli	42. Raun
3. Baskania	27. Paithani	39. Kahali Talli	43. Patal
4. Khalna	28. Bitholi Talli	40. Kande	44. Gawar
5. Gubtali	29. Taya		45. Masnaula
6. Nauri	30. Jhola		46. Ganoli
7. Naini	31. Kora		
8. Nainoli	32. Bayala		
9. Sumwali	33. Bagjewala		
10. Simalgaon	34. Thamar		
11. Mohani	35. Nar		
12. Bedholi	36. Bitholi Malli		
13. Banoli			
14. Bari			
15. Kui			
16. Rana			
17 Dhargaon			
18. Kotila			
19. Bhumkia			
20 Dabhar			
21. Tumri			
22. Phalduri			
23. Khagreti			
24. Walna			

With a per capita requirement of 40 litres of water per day, the entire population of 9077 people, would need a total availability of 363,000 litres of water daily. The December survey of these forty six villages clearly indicates the availability of such quantities of water locally. Between the primary and secondary water resource base, even in its present condition, it is possible to arrange for a regular supply of the minimum requirements of the people.

However, for the future, it would be in form to systematically measure the waterflows of the Riskan at various strategic locations. An exercise of this nature, spread over a period of five years, would reveal significant information regarding not only waterflows but also the state of the watershed.

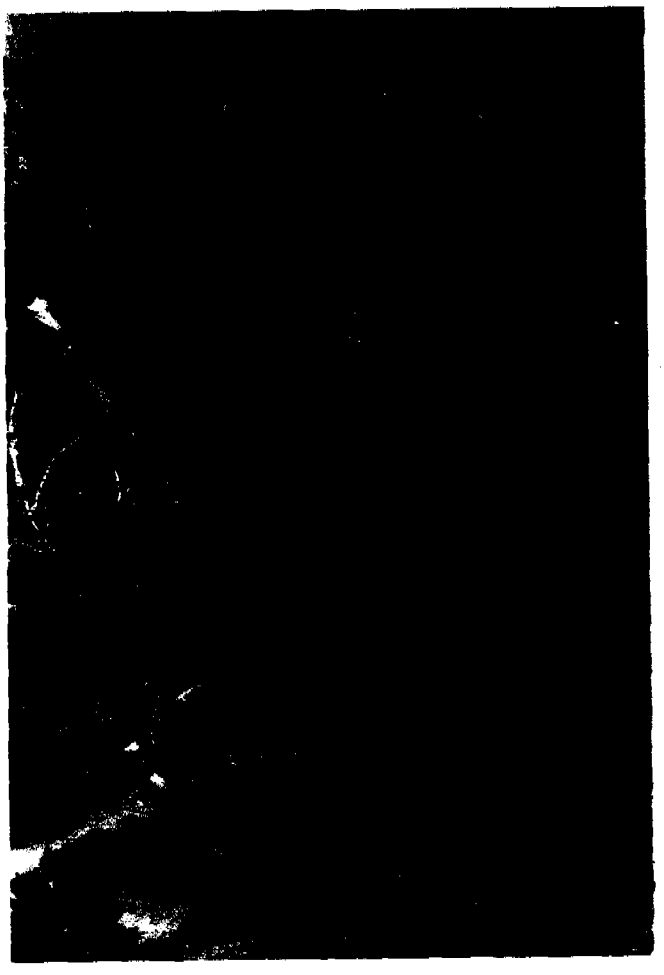


All along the Riskan there are places of pilgrimage – natural shrines devoted to the hill and to water, features considered sacred since early pahari culture. The most humble naula would position the diety in a central point like the photo above which shows Ganeshji inside the Kahali Talli naula. Somehow, with changing times and strong currents of external inputs, the local people have not been able to adopt the benefits of piped water supplies. The state of the piped water schemes do not reveal an iota of reverence. And, it is this crucial socio-cultural aspect which needs to be focused upon in order to upgrade the overall water availability situation at the local level.

CHAMNI

The Dhargaer-Chamni drinking water scheme, implemented in 1984-85, is currently non-functional. Repairs undertaken during 1992-93 did not improve matters. Besides the technical defects, the scheme suffers from the drying-up of one of the two sources.

The intake chamber was located on Gothan gadhera to take advantage of the waters of this gadhera and also direct the flow of Dhargaer spring, from a short distance north-east of the intake. The flow of this spring has reduced to less than a trickle, which is not too surprising considering the ravaged catchment. Unfortunately, the catchment area was a matter of dispute between Chamni and neighbouring Asgoli for several years and the situation of conflict resulted in complete denudation of such a critical area. Just last month the matter has been officially resolved through the revenue department and the area demarcated as part of Chamni van panchayat. Over the next five years, this scrub land could be reforested by the van panchayat.



As the Dhargaer spring flow had deteriorated, during the recent repairs, it was disconnected and a new intake chamber constructed for collecting the water of just the Gothan gadhera. At that time, pipes were also laid for providing water to the Harijan tok which had been left out earlier. Stand-posts are yet to be installed for this tok. In any case, the waters of Gothan gadhera flow into the newly constructed chamber and leak out immediately - not a drop reaches the stock tank situated on top of Chamni.

There is yet another flaw in the entire setup. Look at the picture below, with the main outlet pipe from the stock tank, instead of being provided with a reducer, has been fitted on to a larger diameter pipe. Obviously, the air locks are terrible and it is rather difficult for the water to flow into the various stand-posts of Chamni.

According to us, this scheme could be quite easily repaired and made functional. However, considering the reduced water-flow, it would be a better idea to provide water from this scheme only for the Harijan tok which has 18 households with a population of 100 people. After providing the minimum requirement of 4000 litres to this tok, the surplus could be allowed to flow into the existing stand-posts of Chamni. Repairs would imply the construction of a proper intake chamber, re-laying the pipes underground from the stock tank to the Harijan tok and installing two new stand-posts.

For Chamni village, which consistsof two toks, Chamnigaer and Chamnidhar, it would be advisable to consider a fresh proposal, based on a nearby water source.

These two toks are currently dependent on two fragile spring flows called Kanshan and Bijrani springs. Both these sources are around five hundred meters away from Chamnigaer and Chamnidhar respectively. Two old open-tanks, meant originally for irrigation water, are currently storing these spring-flows for the residents of these two toks.

About five hundred meters to the east of Chamnigaer there is a very good spring called **Chamni-Kunsiari Kulugadhera Dhara**, with a flow of 1 litre in 3 seconds or 30,000 litres per day. This spring-flow could be utilised for providing the minimum requirements of water to both the toks. The total number of households are 38 with a population of 205. Supply of 8200 or say 10,000 litres per day would be sufficient.

Since this source is located at 1150 meters above the sea level, water would be able to flow through gravity upto both these toks, situated between 1100-1110 meters. Two new tanks, of 5000 litres capacity each, would need to be installed at Chamnigaer and Chamnidhar. Pipelines of one km would also need to be laid underground from the spring to these two tanks.

This spring is, however, claimed to be the property of the neighbouring village, Kunsiari. During summer, or whenever there is a water shortage, the residents of Kunsiari as well as Chamni drink this water. According to people of Chamni, it would be impossible for Kunsiari folks to allow the waters of this spring to flow to Chamni! We discussed this at Kunsiari and explained that Chamni would require only 10,000 litres of water per day, which could be collected between 7 pm and 5 am everyday. Over a ten hour period, this spring would be able to provide over 12,000 litres of water. For the rest of the day, the spring would be left untouched for Kunsiari!

It is proposed to install a new tank at the base of this spring with a capacity of 10,000 litres. From its mid-point, an outlet pipe could be provided to supply water to the two smaller tanks of Chamni. With this arrangement, at any point of time, there would be a stock of 5,000 litres of water in the tank for Kunsiari.

KUNSIARI

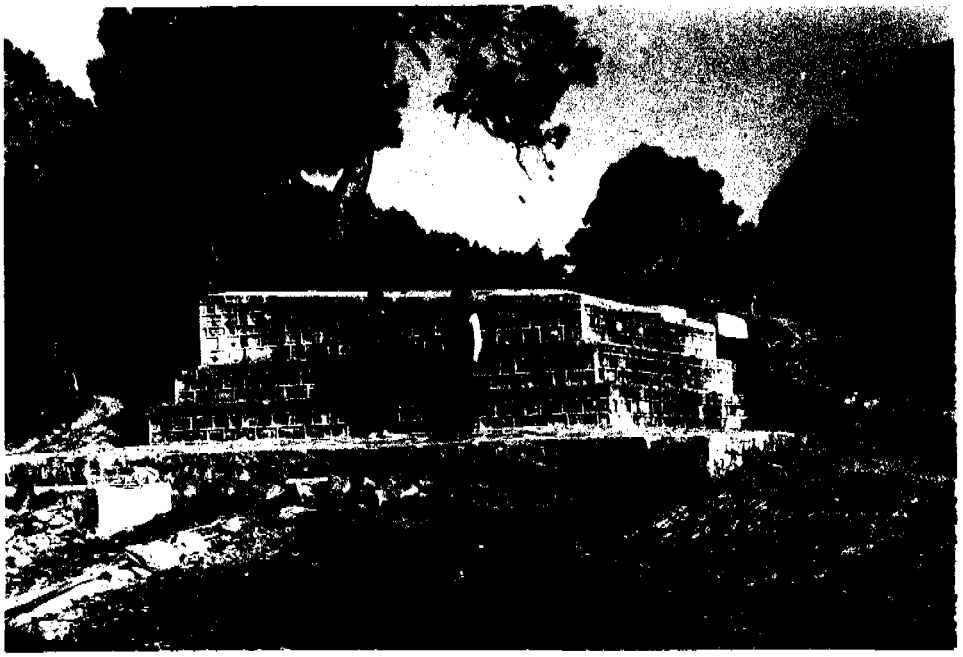
The ridge-line of Kunsiari forms the watershed boundary of Riskan and Khirau gadheras. Based on the Khirau, at a point below Kuna, a twenty-year old scheme pipes water to Kunsiari village from a distance of ten kilometers. It is amazing to find water spouting forth from all seven stand-posts at Kunsiari and five others in the neighbouring toks of Painauli and Baskania (which are parts of Tipola gram sabha).

The water stock tank on top of Kunsiari is in excellent condition, but the intake chamber and gallery would require some maintenance-repairs. Portions of the ten km long pipeline needs to be laid underground.

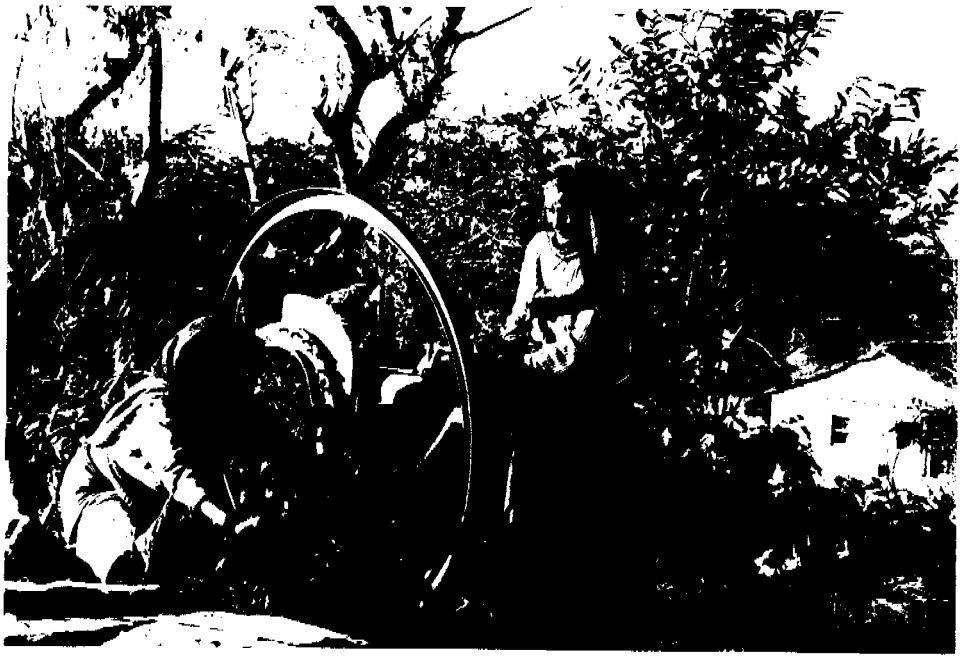
Two new stand-posts would need to be installed to take care of the additional homesteads since the inception of this scheme two decades ago. It would also be advisable to install two small tanks of 5000 litres capacity each for Painauli and Baskania, in order to take care of the water distribution-pressure hassle.

People at Kunsiari would also like to construct a cattle trough, which is a sensible idea, as it would take care of the slush created around the stock tank from its regular overflow.

Much of the credit for this functional scheme probably rests on the shoulders of the local linesman who has been working since inception of the scheme. So much so that currently he also happens to be the elected gram pradhan of Kunsiari. One reason for the people to have consistently rallied around the linesman for repairs of the distant source near Kuna is due to the lack of any other alternative source of water close to the village. The Kulugadhera spring mentioned earlier under Chamni, is quite a way below the village and Kunsiari folks use it only during emergencies.

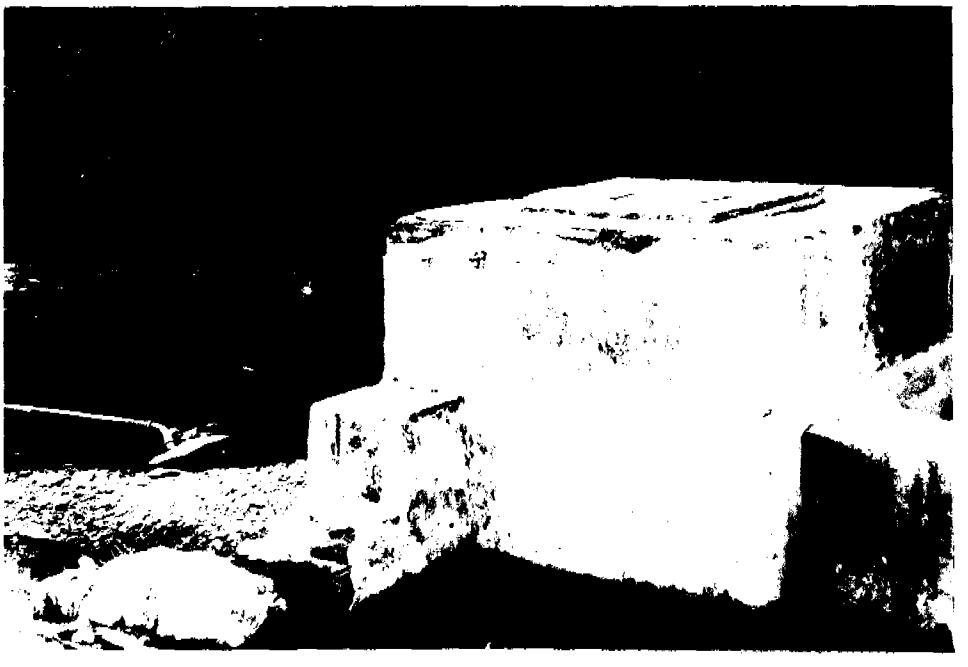


The old stock tank, still in good condition, on top of Kunsiari
Recently, dairy coops have been organised....improved breeds of cattle have arrived in the village and along with it a chaff-cutter...most unusual sight!!



KHALNA, DHURA, SIMALGAON, MOHANI & GODI

This multi-village drinking water scheme, implemented during 1985-86, is ridden with problems. It cannot be described as non-functional, as on the day of our visit, water was flowing into the Khalna tank as well as the tank at Simalgaon and even into those at Mohani and Godi. Only the Dhura tank was lying empty. However, two days later when we were walking upto the distant source, past Bhimandeswar temple, at a point called Surajkund, based on the Riskan, quite a few leaking-points were observed. And, sure enough, when we re-checked at all these villages, the water supply had stopped entirely. So the scheme cannot be described to be functional either!!



The intake chamber at Surajkund-on-Riskan : 1260 meters altitude

Tank 1 : Simalgaon at an altitude of 1160 meters
Tank 2 : Mohani at an altitude of 1200 meters (tok of Talli Bitholi)
Tank 3 : Godi at an altitude of 1160 meters (tok of Kande)
Tank 4 : Dhura at an altitude of 1250 meters (tok of Paithani)
Tank 5 : Khalna at an altitude of 1250 meters

One clear problem of this scheme is the poor water distribution-pressure, which is due to the low head. Between the source at Surajkund and the various tanks there is only a small difference of 10-100 meters. The problems associated with the especially low heads of 10 meters, viz., at Khalna and Dhura, could be resolved through adoption of appropriate distribution systems based on gate-valves, reducers, etcetera.

The restoration of this scheme to its full potential is possible and ought to be done on an urgent basis as several hundred people are dependent on it.

Khalna	438 people	17,500 litres per day
Dhura	26 people	1,040 litres per day
Godi	60 people	2,400 litres per day
Mohani	69 people	2,760 litres per day
Simalgaon	145 people	5,800 litres per day
	738 people	**29,500 litres per day**

Firstly, the filter chambers ought to be repaired and the water made to flow through it, instead of the current practice of by-passing it. Thereafter, the four un-necessary crossings of the main water pipes, over the Riskan, need to be re-aligned, on lines similar to the recent renovations of the parallel scheme for Sumwali cluster.

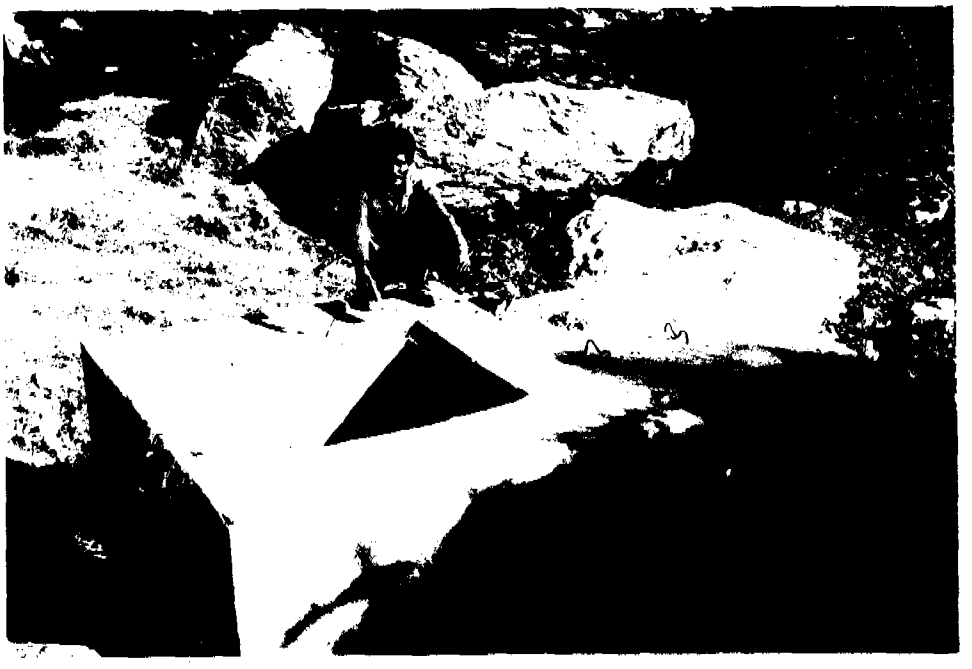
These crossings over the Riskan create problems during the onrush of great volumes of water during the monsoon season each year. It is common for pipes to get dislodged and unions and joints require changes very often. Which in turn affects the threading at the two ends of the pipe-sections. And, instead of replacing such pipe-sections with fresh pipes, it is common to make-do with small attachments, which invariably make weak joints and start fresh leaks.

For such a scheme as this, it would be advisable to also create a system of water distribution to the five tanks through regulatory gate valves. So that the Simalgaon tank does not overflow, as at present, and affect the flow of water to distant Khalna adversely.

Two facts ought to be borne in mind regarding this scheme. The source at Surajkund is sufficient for supplying 29,500 litres of water per day. And, it did supply such quantities on a more or less regular basis for the period between 1985-90, when a linesman was appointed on a handsome salary of Rs.750 per month. For the past three years, the scheme has been handed over to the Jal Sanghsthan and the system of an appointed linesman disrupted.

Khalna, which is at the tail of this scheme, also happens to be situated on the ridge overlooking the Riskan. Since the supply of water through this scheme is critical on this ridge-top village, the old linesman has been retained by them on an informal payment basis of Rs. 8 per month per household. Only the households of Khalna pay this meagre amount to the linesman and he does what is possible for him to do considering the changed circumstances. The scheme hiccups more often than not!!

While it is imperative to restore this scheme, which would require basically a maintenance system to be adopted by all the concerned user-groups, it may be worth looking into some fresh potentials.



The filter chambers which have been by-passed and one of the four crossings over the Riskan which is a frequent cause for disruption of water supply

Simple maintenance systems through local self-help groups and trained linesmen, like Jaswant of Khalna, could prevent leakages over long pipelines and ensure regular water supplies

Godi and Mohani are two small toks with 60 and 69 people respectively. For the two tanks of these toks, the pipelines have to be directed east for over a km. If handpumps could be installed successfully for both these toks, then the pressure of supplying water to distant Khalna would become a lot simpler.

The picture above shows two existing spring sites where one enterprising farmer has sunk a well six feet deep for irrigating his kitchen garden. There seems to be good potential for sinking two wells with handpumps attached. While these handpumps could be used by the residents of Mohani, including the ten odd harijan households who are unable to benefit from the existing scheme, there are similar potential sites for Godi too. One handpump would be sufficient for the ten odd households of Godi.

In the same spirit, it would be advisable to sink one good well at Khalna too - one potential site exists. The proposed handpumps could provide relief not only during disrupted water supply periods, but also be able to reduce the general load on a multi-village scheme such as this.

To summarise, it is recommended to :

* repair the scheme
* sink at least one well in Khalna, Mohani and Godi
* create a regular system of operating the scheme

Much field work ought to be anticipated in terms of community organisation since several villages are involved in deriving a common benefit.

Children benefit immensely with functional water supply schemes, but they certainly need to be educated regarding the protection of pipes and upkeep of taps...a child in Godi enjoys water from a tap adjacent to his house, but the stand-post in his school at Simalgaon is in a vandalised state

BEDHOLI

This village has a functional water supply scheme based on the distant Sirkanda talaab on the Bichilima gadhera, which is a tributary of the Riskan.

For just fifty households there are fifteen stand-posts, the best average in the entire watershed. Even then, one family wanted us to note their desire for a stand-post closer to their homestead.

Some minor maintenance is necessary at the stock tank especially to take care of the overflow and the slush created by it.

The minimum requirements of water for the 336 residents of Bedholi are being met quite adequately through this scheme.

Bedholi has a very severe firewood crisis and people use a lot of kerosene for cooking - they have to purchase firewood too, from villages like Mohani and Godi.

GUBTALI

The water supply scheme, implemented in 184-85, from Bharna gadhera which is a little over a km away, is functioning well. The three stand-posts provide more than sufficient water for the 25 households with 145 people.

Due to excess water availability, an irrigation channel is being constructed currently.

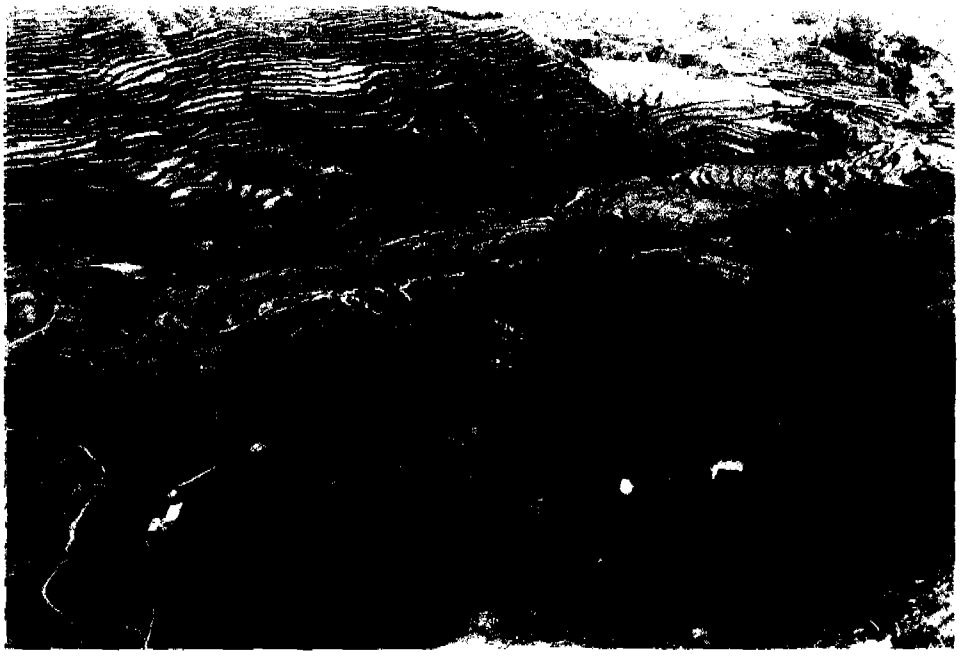
RAUN, PATAL & SILANG

These three toks of Asgoli gram sabha are self sufficient as far as water requirements are concerned. All three toks, with 16, 17 and 5 households respectively fetch their water from the primary sources adjacent to their homesteads. '

BANOLI AND BARI

About fifteen years ago, a drinking water supply scheme was implemented for Bari village. The source being a magnificent spring, three kms away, below the Chatgulla ridge which forms the watershed for Khirau and Riskan gadheras. This same spring had been channelised since olden times by the villagers for providing critical irrigation water to their fields just below the homesteads.

The stock tank over the village, the pipelines and the stand-posts are functional and do not require any repairs.



But the fields are un-irrigated today....

Couple of years ago, this scheme was extended to Banoli, about two kms away, directly from the Bari stock tank. The pipelines are completely exposed and would need to be laid underground. The stand-posts have not been constructed fully and to cut the story short, the extention of the water supply scheme has not been quite as successful as people would like to imagine. Water flows at Banoli in spurts and that too not through all the stand-posts.

In order to repair the system for Banoli and Bari, the following items would need attention :

* minor repairs at the spring site for the intake chamber

* laying the pipeline from Bari stock tank to Banoli underground
* installation of a small stock tank, 5000 litres capacity, for Banoli
* construction of three proper stand-posts at Banoli

The system, once repaired fully, is quite capable of providing the minimum requirements of water for Banoli and Bari.

Bari	181 people	7,300 litres per day
Banoli	127 people	5,100 litres per day
	308 people	**12,400 litres per day**

It is imperative to restore this scheme properly as there are no decent options available for either of the two villages. Folks from Bari would need to trudge up the gadhera way below the village or carry water from the spring site three kms away. And, for Banoli the only option is to carry water directly off the Riskan stream. Though the Riskan flows close to Banoli homesteads, the nature of the water quality is certainly dubious.

The entire pipeline from Bari to Banoli needs to be protected

PAITHANI AND NAURI

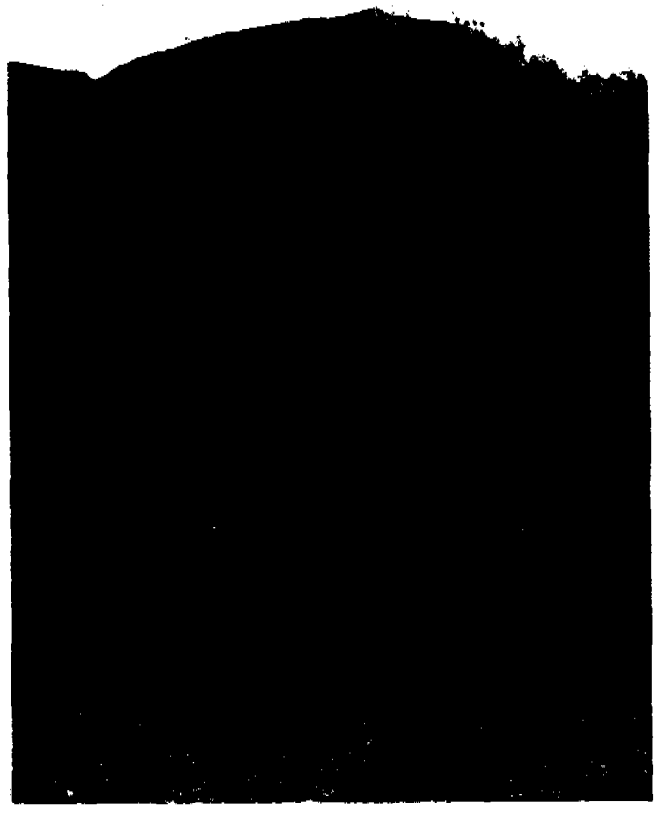
Paithani is a large village with 72 households and Nauri is one of its tok with 10 households. Nauri is just a stones throw away from the Sumwali stock tank and therefore manages to receive water for most of the time. However, Paithani being at the tail end of such a complicated multi-village scheme barely receives any water supplies.

Moreover, the stock tank at Paithani is yet to be constructed. For over a year, nine half-complete stand-posts spout forth water from time to time. It would be necessary to complete the construction of the tank and stand-posts at Paithani as soon as possible. Especially as there are hardly any options available other than collecting water directly from Riskan which flows past the village.

There are two alternate water supply schemes which are being described herein. The idea is to discuss the possibility of dis-connecting Paithani altogether from this farcical scheme and create fresh alternatives, which would be more manageable.

Bijrani spring on the Nainoli gadhera

The Bijrani spring is located at 1200 meters above the sea level at a distance of less than 2 kms from Paithani. In the old days, waters of this spring flow and others in the Nainoli gadhera, used to be channeled upto the fields of Paithani for irrigation. A simple gravity-flow water supply scheme could be implemented from this source down to Paithani at 1100 meters altitude. Of course, summer discharges would need to be measured prior to deciding in favour of this proposal. However, it is clear that it would be quite within the people to maintain a scheme which originates two kms away instead of the Sumwali scheme which is more than 15 kms away.



The other option is to sink a well near the old naula of Paithani which is located across the Riskan. The waters of this well could be brought through gravity-flow upto the village. If the handpump operation proves successful, then it would be a good way of hedging against the risk of failures associated with long distance water supply schemes.

SUMWALI, NAINI & NAINOLI

The 65 people of Sumwali do not really have any problems regarding drinking water supplies as the stock tank over their village receives water directly from the source, based near Khagreti on the Riskan. They suffer only when the water supply is disrupted due to damages in the pipeline which is over 15 kms long.

The stock tank on top of the Naini ridge is also supplied with water from this scheme. This tank is meant to provide water to the 49 households of Naini and its tok, Nainoli, with 11 households. Due to lack of any systematic water distribution mehtods, both these settlements suffer from time to time. Sometimes the Nainoliresidents would walk up to the stock tank and divert the flow to their stand-posts, like on the day of our visit. Very soon the water would stop flowing down to Naini and the Naini folks would walk up to the stock tank and reverse the flow. In the process, crude methods are resorted for jamming each others pipes and much damage is caused to expensive water supply schemes.

Basically, there is sufficient water for all these three communities and only a systematic community organisation effort is lacking. Once that aspect is taken into account, there ought to be no problems regarding water supplies.

At Nainoli people are making a smart move of creating a new naula just below the old naula (behind the banana plant)...for 11 households, this would serve well, especially when the Naini stock tank fails to supply any water

BITHOLI TALLI, JHOLA AND TAYA

All these three small settlements are parts of the Bitholi Talli gram sabha. The water supply scheme for them is basically an integral part of the multi-village Sumwali scheme. While the scheme is functional for Sumwali and other villages attached to it, these three settlements do not receive much water or attention from the Sumwali scheme.

The huge empty stock tank between Jhola and Taya is well constructed

The main reason for this tank to remain empty is probably due to the nature of the water distribution system. Apparently, the pipeline flows straight from the head located below Khagreti on the Riskan, to the stock tank at Sumwali and then swerves two kms to this tank. Over the last six months, we have noticed the persistent efforts of Sumwali folks to restore the long and winding pipeline, and it is quite possible that the people of these three settlements did not participate sufficiently to derive benefits of this scheme! However, it is possible to discuss the entire matter regarding this multi-village scheme with all the concerned villages and initiate a proper maintenance mechanism whereby water supplies could be more evenly distributed.

Bitholi Talli	20 households with 86 people	3500 litres per day
Jhola tok	3 households with 23 people	1000 litres per day
Taya tok	11 households with 42 people	1700 litres per day
Minimum water requirement		6200 litres per day

It would be advisable to arrange for distribution of water from the Sumwali scheme on every alternate day for these three settlements. The tank is of even capacity to store sufficient water for fulfilling the requirements of two days. The stand-posts are in good condition and needs no repairs.

There are seven idle stand-posts between Bitholi Talli, Jhola and Taya

Currently, the people are dependent on two functional naulas, one at Taya and another at Jhola. The Magargaer naula, under a kafal tree, at Taya has good potential for sinking a well close to it. It may be in order to propose the installation of one handpump to take care of emergencies during summer, when the demand on the naula increases tremendously and the Sumwali scheme fails to deliver water upto the stock tank.

It is this naula which takes care of the 42 people of Taya and some others too Local communities do not have the wherewithal to reforest the denuded hills which form the catchment of their primary water resources, nor do they have the necessary management skills for maintaining the water supply schemes

KAHALI TALLI, MAINOLI & KAHALI MALLI

Kahali Talli gram sabha has 86 households with a population of 317 people. The village is divided into two almost equal halves, the harijans on one side and the others a bit removed to the north. The entire village is dependent on the primary water resources, which measured a summer discharge of 21 litres per capita per day. The water supply scheme based from distant Dwarahat town had become non-functional within a month of its implementation due to objections of the Dwarahat Town Area Committee - the pipelines had been taken directly from the stock tank of the town and this had resulted in water shortages for the town dwellers.

Currently, people are dependent on two main primary sources, one springflow and another naula. A second naula is being repaired and it is expected to improve the total water availability situation.

Through local initiative this old naula site is being renovated at Kahali Talli

It is possible to increase local water availability even further by probing the potential for sinking a well close to the spring-site. Since all these primary sources are about 100 meters below the village, possibilities of lifting stored water (from the primary sources) could also be planned at a later stage.

Kahali Talli gram pradhan at the spring-site

In neighbouring Mainoli, which is a part of Kui gram sabha, the per capita water availability during summer measured 63 litres per day. Whereas, in the other adjoining village, Kahali Malli, which is also a part of the same gram sabha, the per capita water availability during summer was a low of 2 litres per capita. The old scheme of Kahali Malli is non-functional for the same reasons as Kahali Talli.

However, the Naini Dhara Pumping Scheme, which is currently under construction, would resolve the water shortages of these villages once it becomes operational.

GAWAR

In Gawar gram sabha there are eight small toks spread over a huge area. There is Madigaer tok with some twenty Harijan households at the base of the Baleswar gadhera and there is Haldu tok on the spur of the hill on the far side and there are six more toks stretching up from Madigaer to the ridge and halfway down to Godi gad near Bhimandeswar temple. And, surprisingly enough, this large gram sabha with **144 households and 736 people**, do not have any water supply scheme.

There is an acute water shortage in the entire gram sabha and probably the best of a watery world is for the Madigaer folks who need to walk a short km to fetch water from the Baleswar gadhera. The primary sources like naulas are almost completely dry, but it would be in order to reserve further comments till summer when measurements may make more sense.

It is, therefore, quite imperative to design an optimal water supply scheme for all the toks of Gawar. One option, currently being planned by the government department, is to set-up a scheme for supplying water through gravity flow from the Baleswar gadhera, which is about five kms away. According to this survey, two toks - Haldu and Madigaer-would be left out due to its altitudinal location as compared to the proposed head in the Baleswar gadhera.

The other option would be to set-up a small pumped water supply scheme. The advantage of this would be that all toks could be provided with water through small distribution tanks. A kerosene/diesel operated pump would be needed for lifting water from Baleswar Gadhera at 1450 meters upto the ridge near Runkhet at around 1550 meters. Pumping 30,000 litres of water to four small stock tanks located within a climb of 100 meters is not a herculean task by any standards. Two village lads could be trained at a reputed firm like Kirloskar, Poona and 'employed' by the Gawar gram sabha to operate the water supply scheme. With 144 households, a monthly contribution of Rs. 20 would be sufficient to maintain the scheme.

KUI

The primary water resource base of Kui is able to provide 19 litres of water per capita per day during summer. It appears to be possible to increase local water availability through installation of two handpumps within the village.

KOTILA

The water supply scheme in Kotila is the oldest in Riskan as well as in the entire Dwarahat Block. Implemented in 1957, the scheme has been directly under the charge of the villagers right from construction to maintenance.

The scheme is based on a very strong spring source located beside the village. There is an unique system of ensuring adequate water distribution-pressure for all the stand-posts in Kotila, through a tank installed between the source and the stand-posts.

This village has not only been able to maintain its drinking water supply, but the traditional arrangement of utilising the waterflows of the gadhera for irrigation is also operational. The waterflows of the gadhera have been channelised into several stone reservoirs in a staggered fashion. These reservoirs also act as a watering-hole for their cattle in summer.

Kotila is a perfect example of systematic water management entirely through local participation

RANA & KORA

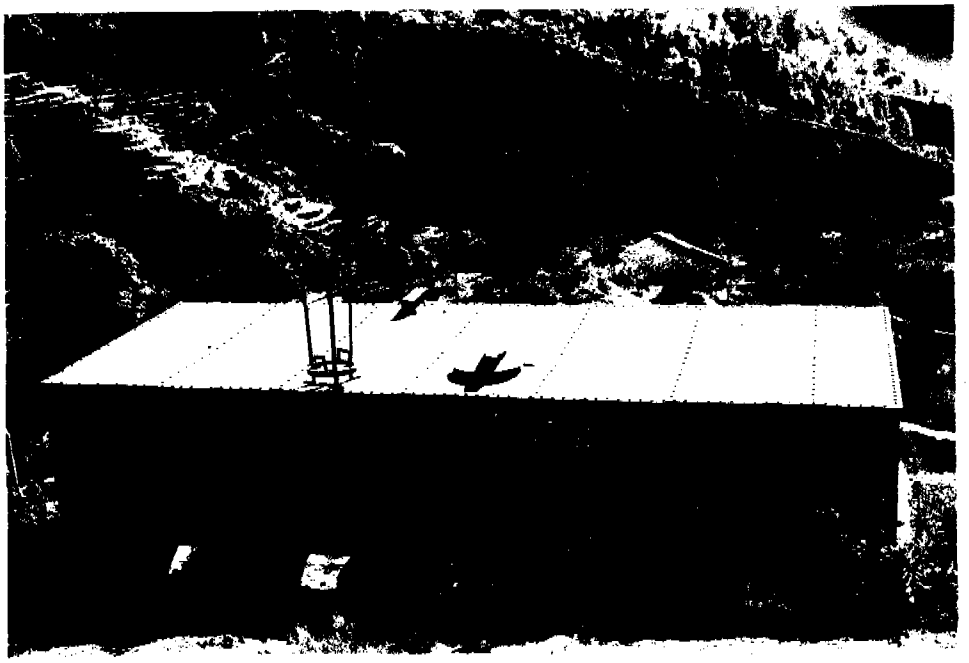
The water supply scheme of Rana and Kora are based on a distant secondary source about four kms away from Rana village. There is plenty of water at the source and the scheme has been able to satisfy the minimum requirements of 7000 litres per day for the 179 people of Rana. The extention of this scheme to neighbouring Kora, which also happens to be a part of Rana gram sabha, has been a disaster right from inception.

The tank at Kora does not receive any water and the pipeline from the Rana stock tank has been left open-ended - water does flow out of it from time to time. Most of the time, the 18 households of Kora have to fetch water from the Riskan stream, which entails a stiff climb of 20 minutes.

Case of the missing stand-post at Kora!!

The Rana-Kora scheme would require some amount of restoration work and then

it would be able to satisfy the needs of both villages quite adequately - there is ample water at the source. The stock tank at Rana overflows on a regular basis.



It would be appropriate to promote water stock tanks like this at Rana

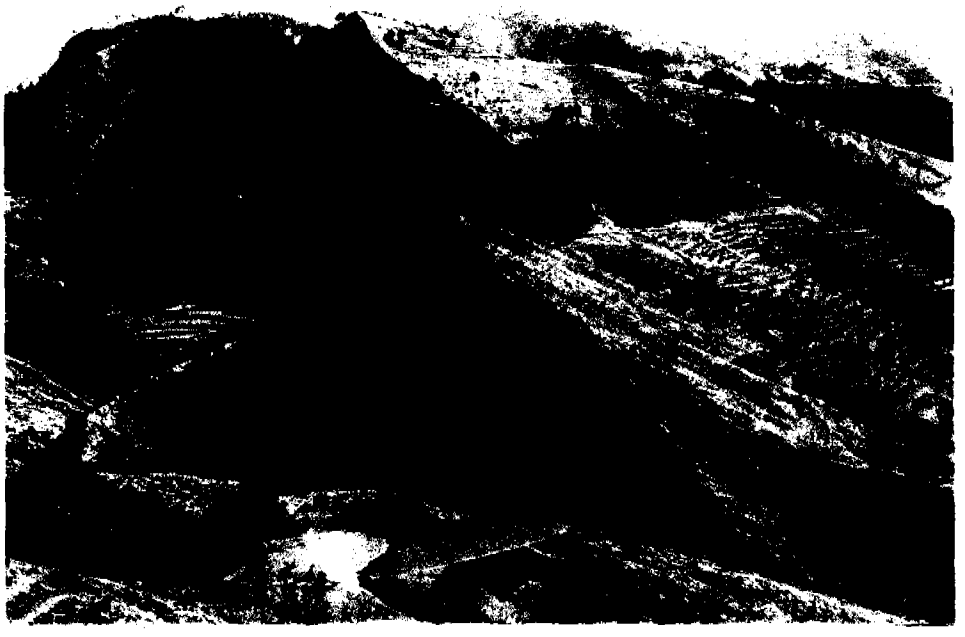
The following repairs are recommended:

* to stop leakages at the intake chamber
* to protect four kms of pipeline from damage by grazing animals, especially the section which crosses the commons of Gawar
* installation of a small 5000 litres capacity stock tank at Kora
* construction of two stand-posts at Kora

Two households of Kora would still not benefit from this scheme as they are located way above near the ridge. The pipelines of Kande are being laid a few meters away from one of these two homesteads. Considering the overall scenario, it would be advisable to provide a T-junction near the ridge and allow a small outlet for these two homes from the Kande scheme - otherwise it is certain that the Kande pipeline would be damaged from time to time.

DHARGAON

This is a small tok of Rana gram sabha with 14 Harijan households and 76 people. Their minimum water requirement is being provided through one stand-post, which is part of the Walna scheme. Even though the stock tank at Walna overflows every few hours, the supply is quite irregular. This could be streamlined by changing the T-junction to a higher point on the Walna pipeline and installing a small tank of 5000 litres capacity for Dhargaon. (This tank would simultaneously ensure improved water supplies to the 12 Harijan households of Walna-par who have been provided with a stand-post from the same T-junction.)



Dhargaon ought to initiate community forestry efforts considering its location in the heart of the watershed

WALNA

The long distance water supply scheme of Walna, sourced near Tumri gadhera, needs to be streamlined in order to improve its efficiency. Currently, the stock tank at Walna is said to overflow every few hours. During our visit, we watched women bathing their cattle quite generously from this overflow. But the settlement across the main village, which is very much a part of Walna, suffers from irregular water supply. And, the other small settlement just over the ridge, Dhargaon, also has the same problem.

The following restoration works are being suggested:

* Laying the entire six kms long pipeline underground
* Installation of a 5000 litres capacity stock tank for ensuring proper water supplies to Walna-par and Dhargaon
* Construction of an adequate cattle trough near the existing stock tank
* Formalising the T-connection at Phalduri
* Introduction of appropriate gate valves to regulate the flow of water to the proposed stock tanks
* Formalising the existing village-level maintenance arrangement which suffers from time to time

It may be prudent to caution that these arrangements would require considerable efforts regarding community organisation.

The Vasundhara at Walna is almost a trickle compared to earlier times
Two grand old specimens of Toona ciliata died recently...its about time to look seriously at the wasted hillslopes stretching upto the ridges and beyond

PHALDURI & MASNAULA

Phalduri and one of its toks, Masnaula, both have a water shortage problem. Together, their minimum water requirements are as follows:

Phalduri	41 homesteads 221 people	9000 litres/day
Masnaula	16 homesteads 55 people	2200 litres/day
Minimum water requirement per day		**12,000 litres**

The following improvements could lead to sufficient availability of water for both Phalduri and Masnaula :

* The existing scheme could be improved by adding an adjacent spring flow about 100 meters away in the same gadhera. The old intake chamber would need to be enlarged, the pipelines changed for about 2 kms and an additional tank would also need to be installed as the old tank is too tiny in capacity - roughly 2000 litres. Side by side, three more stand-posts could be added on to the existing four, so that water distribution between different communities do not pose a hazard. In this manner, about 9-10,000 litres of water could be made available to the 221 people of Phalduri.

* Phalduri has access to a T-connection from the pipeline of Walna which crosses the village. The Walna folks obviously resent this informal arrangement but have accepted it to a large extent, especially as there is plenty of overflow in the Walna stock tank and it also ensures that their pipeline is not tampered by the Phalduri people who are known to suffer from water shortages. Since Masnaula is about fifty meters below the T-connection, it would be ideal to install a small stock tank of 3000 litres capacity and store water from this connection. Once proper systems are laid with gate valves and operators, there ought to be no problems with formalising such an arrangement.

The T-connection from the Walna pipeline passing through Phalduri

The old glories of Phalduri....wood carvings and rock solid naulas

NAR

Nar is a revenue village which is a part of the Phalduri gram sabha. It is a small settlement with 25 households and 160 people, nestled amongst oak trees. This is the only patch of oak forest draining a small tributary right in the heart of the headwaters of Riskan gadhera. Nar, therefore, is quite special in the otherwise bleak Riskan catchment of the Gagas sub watershed. Women here do not need to trudge up and down distant hill slopes scrounging for firewood or fodder, for it is a situation of plenty biomass availability.

Of the three water supply schemes, only the recent scheme implemented through the JRY, directly by the villagers, is functional. This scheme is based on a very good spring, called the Tupkia srote, barely 200 meters from the village. Of the four stand-posts, three are working smoothly while the fourth suffers from the usual hassle of a poor water distribution-pressure. For the thirteen households dependent on this JRY scheme, the supply of minimum water requirements are being met quite adequately.

One of the old schemes for the nine Harijan households is non-functional for the past few years. Currently, a scheme is being implemented from the Sila srote which is roughly 400 meters away from these homesteads. The remaining three households are located on a distant spur called Nishau. Being at a much higher altitude, these three households cannot possibly be provided with water from any of these schemes; they seem to be quite content with the water available from the adjacent gadhera.

The other old scheme, based on the Kiwani srote is in a shoddy state, even though repairs had been undertaken just a month ago. The intake chamber and the stock tank both require to be repaired adequtely as the water trickles upto the tank and leaks away. The stand-posts could be described to be non-existant. It is worth restoring the scheme as it is based on a local source less than a km from the village.

To summarise, the following repairs would be necessary:

* three stand-posts need to be installed properly
* complete renovation needs to be undertaken for restoring the Kiwani srote scheme and the work ought to be the direct responsibility of the villagers

KHAGRETI

This is a tok of Phalduri gram sabha but quite removed from it geographically. There are just 14 households with 85 people.

The existing water supply scheme is based on a well protected gadhera adjacent to the village and water gushes out at good pressure from all the stand-posts.

Some minor repairs are required in the pipeline and a cattle trough needs to be constructed near the stock tank to take care of the slush and erosion.

KANDE

The earlier document had outlined the acute water shortage in Kande and the possibilities of adequate water supplies through implementation of a scheme which had been pending with the local authorities.

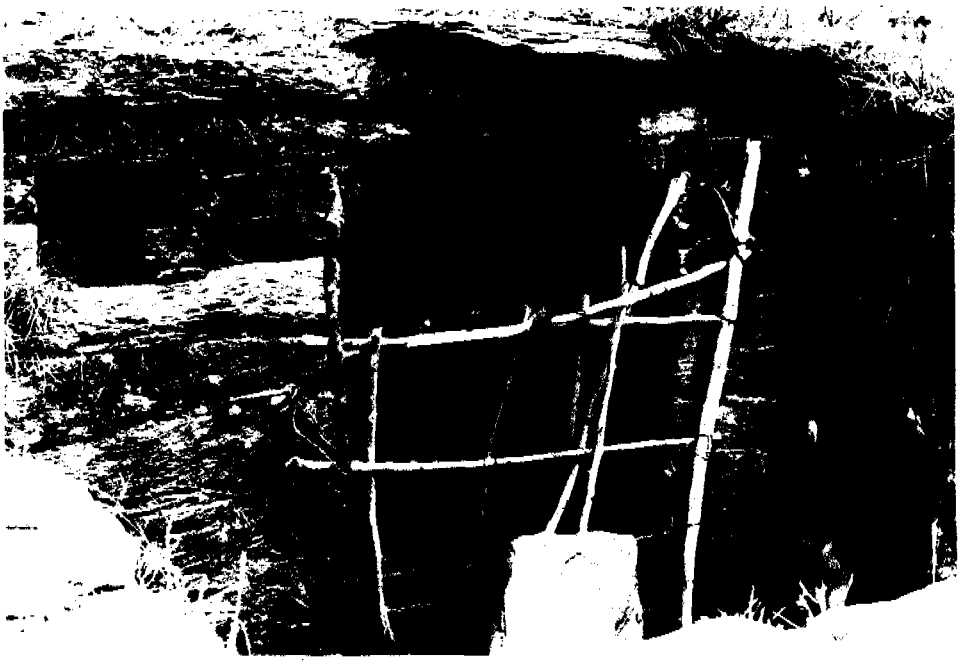
This proposed scheme is currently under implementation and over fifty percent of the work has already been completed. It is quite likely that the scheme would become operational within the next few months, hopefully prior to the summer season of 1994.

BITHOLI MALLI AND GANOLI

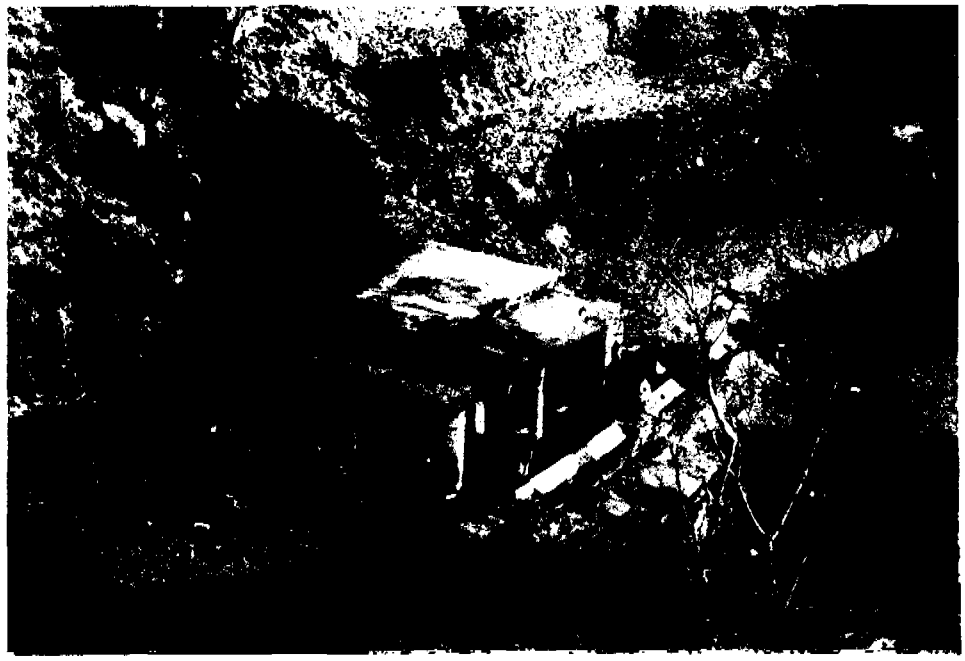
The water supply scheme for Bitholi Malli, based near the cremation grounds below Nagarjhun temple, is non-functional and even the future looks bleak as people are most disturbed about the site of the head. Changing the head may be impossible as it already enjoys the advantage of being on the highest possible spot in the Riskan. Water is usually rationed during summer.

In Ganoli, the water situation is described to be a regular crisis, probably the worst in the entire waershed. The old Paithani pumping scheme is non-functional for several years and so far no other schemes have been implemented.

An old gaurd rationing-out water from the main naula at Ganoli



Naulas at Ganoli need to be locked even during winter!



A little below the main naula of Ganoli, near the bamboo grove, there seems to be good potential for installing handpumps

It may be worth looking at a fresh strategy for supplying water to both Bitholi Malli and Ganoli. There are two springs below Bitholi Malli with a total flow of 56,000 litres per day.

Kashan srote	1 litre in 6 seconds
Chaura srote	1 litre in 2 seconds
Litres per day	**56,600**

For both the villages with a population of 1159, about 46,000 litres of water would be the minimum requirement. Considering the present availability of some water from the naulas, it may be in order to provide for an additional 30,000 litres of water per day. This amount could be pumped up from the Chaura srote upto the ridge, a distance of 100 meters.

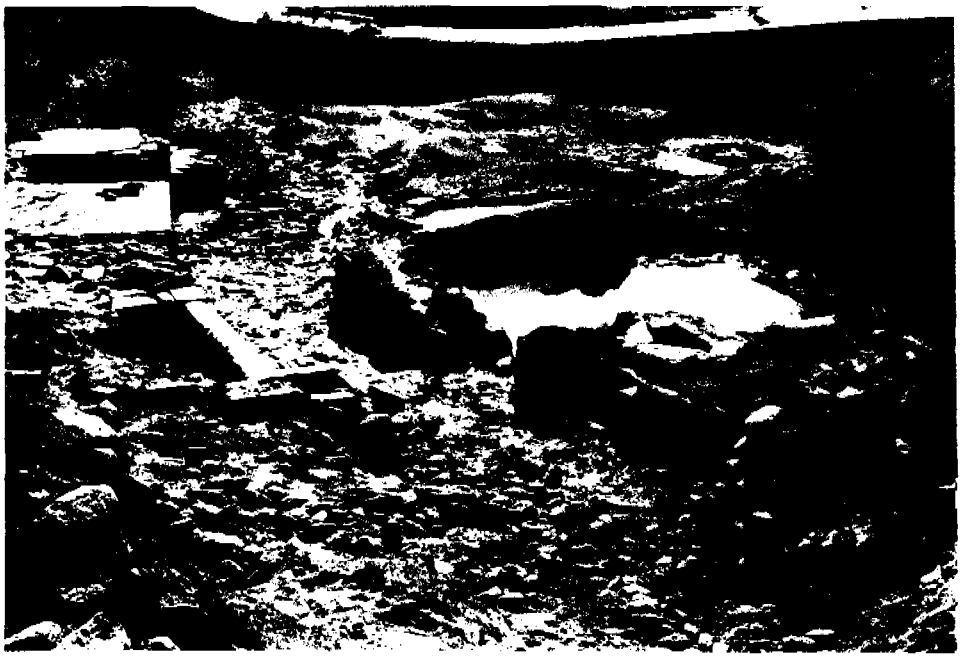
At the ridge, the pumped water could be stored in the existing stock tanks of Bitholi Malli and Ganoli. About ten stand-posts would need to be installed at various points in both the villages to distribute the water. For operating the scheme, two local lads, one from each village, could be trained adequately. This proposal has been discussed threadbare with the local people and they are keen to contribute a part of the capital costs too.

Much of the existing pipelines lying idle in both the villages could be used for the proposed scheme.

BHUMKIA

This village, recently renamed Ambedkar, is situated north-west of Dwarahat town, pretty much on the ridge demarcating Riskan and the Gagas sub watershed from the rest of the Ramganga catchment. On a micro level, Bhumkia forms the headwaters of the Godigad, which is a major tributary meeting Riskan stream at Bhimandeswar.

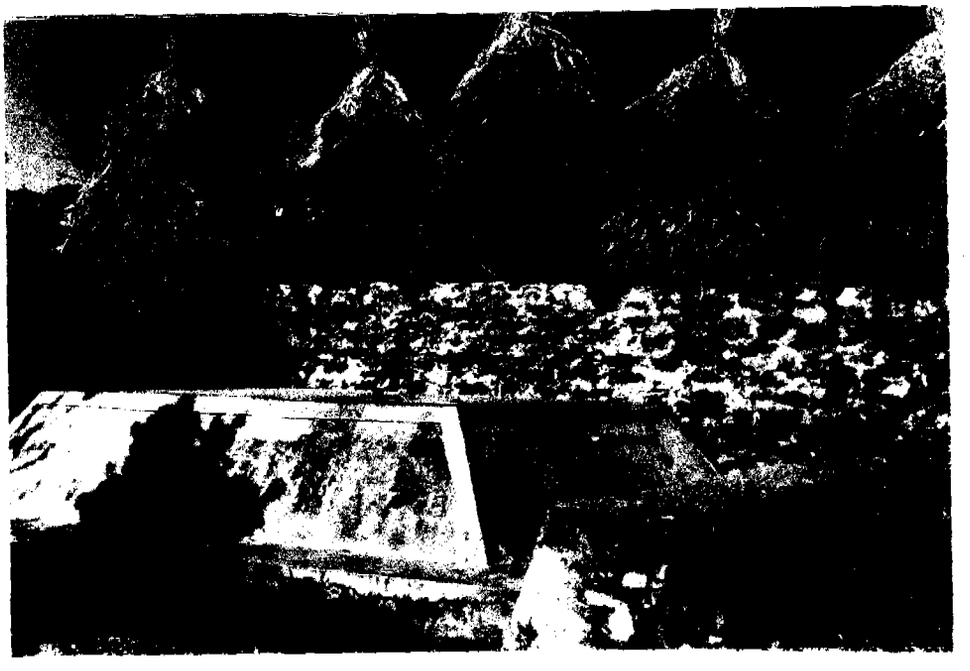
No doubt there are good water resources right on top of the village. However, the state of this precious resource is worthless in its present form of maintenance, shown below.



Potential site for conservation of local water resources
Drawing water from a handpump may lead people to respect such critical zones

With the passing of independent decades, the village not only acquired a new name but also arranged for the government to implement a water supply scheme. Quite typically, the local water resource potential was ignored and yet another scheme laid from distant secondary sources, tucked away in some forlorn compart of an equally ignored reserve forest. During 1991-92 the water supply scheme for Bhumkia became functional and still continues to be so, thanks to the relentless efforts of the gram pradhan, winner of the Surya Chakra while he served the Border Roads Organisation.

The intake chamber of this scheme is located below a point called Jaikhan in the confines of a section of the reserve forest area. Waters from the Goginapani spring flow for two kms through pipes which by-pass the filter chambers and join yet another source at the Koirali Kafal Tree. Together, the waters of these two springs flow upto the stock tank on top of Bhumkia, another six kms away. Recently, the second source at Koirali has been dis-connected, probably due to the antagonistic nature of some folks at Dabhar. In any case, there is sufficient water for the 45 households of Bhumkia. The minimum requirements of 256 people which adds upto a little over 10,000 litres per day are usually being fulfilled.



The Bhumkia stock tank is in good shape and locked

But quite often there are problems in this long winding eight kilometers of pipes, most of which are left exposed for people and cattle to trample upon and disrupt normal water supplies. Therefore, along with protecting the pipeline underground, it is also recommended to reapir the intake and filter chambers. At the village level, there seems to be sufficient will power to maintain the system once it is restored.

Side by side, it would be essential to sink at least one deep well at the site shown overleaf. In the short run, a handpump would provide relief regarding emergency supplies of safe drinking water. More importantly, however, it would demonstrate a feasible methodology for protecting fragile springs at an altitude of 1600 meters above sea level.

BAYALA

For twenty years the Bayala drinking water scheme continued to function satisfactorily. For the past 2-3 years, it is non-functional, for reasons which appear to be mainly related to negligence and lack of systematic upkeep of an old scheme.

The intake chambers and much of the pipelines are in a sorry state

Besides this scheme, Bayala had organised two other schemes through the Block Development Office. Of these two Block Schemes, as they are generally referred, only one continues to function. People at Bayala are completely dependent on the water supplies of this scheme.

It is recommended to attempt increasing water availabilities upto 5000 litres per day through the following measures :

* The functional Block Scheme could be improved through renovating the tiny intake chamber around the spring located in the moist north-western gadhera, laying the pipeline underground, installing a stock tank of 5000 litres capacity and repairing the three stand-posts. (Presently, the stand-posts are connected directly from the tiny intake chamber and there is no tank.)

* There also seems to be good potential for sinking a well in this gadhera.

* The 20 year old scheme could also be restored by repairing the intake chambers and associated pipes. The stock tank does not seem to need any repairs. In terms of priority, it would be advisable to restore the Block Scheme first. Then sink a well and finally repair this old scheme. Meanwhile, it would also be possible to watch the lean season water flow in the gadhera where the old source is located.

The stock tank of the old Bayala scheme and the functional Block Scheme

BAGJEWALA

Just fifty meters below Bayala, yet another twenty year old scheme is non-functional. Its based on the same gadhera as the Bayala scheme, but at a lower point and remains wet even in summer. According to some people, the scheme is non-functional due to lack of maintenance during the recent years. The stock tank is in perfect condition and so are most of the stand-posts. Some sections of the pipeline would need to be re-connected and laid underground. And, of course, the intake chamber would need a bit of cleaning-up. The minimum requirements of around 8000 litres of water per day could be provided once the restoration works are done through peoples participation.

Another option is to utilise the overflow of the north-western gadhera of Bayala referred earlier. Currently, this overflow is channelised for irrigation down at Bagjewala. Moreover, if handpumps could be installed successfully in this gadhera then water could flow down through gravity from one such well.

Exposed pipelines get damaged swiftly and often ruin water supply schemes

DABHAR

This tiny village with 14 households have a water supply scheme based on a distant secondary source, at Koirali, within the reserve forests. The scheme has been functioning successfully since 1985.

There are three stand-posts which provide sufficient water to the people of Dabhar.

It is rather unfair of Dabhar not to allow the construction of a proper stand-post for the Range Office located there.

TUMRI & THAMAR

Tumri consists of four small hamlets with 16 households, spread over four spots located on the left flank of the headwaters of Riskan. There is an abundance of natural water sources in their vicinity, though the state of its upkeep is deplorable. Thamar is also a small tok with just 5 households.

There is a water supply scheme for three of these small hamlets - Koirala Khata with 9 households and Dum Khata with 2 households (of Tumri) and Thamar with 5 households. The state of this is rather strange. The pipelines are exposed, which is typical. But the stock tank is half-complete and the pipeline by-passes both the filter chambers as well as this stock tank. Water flows out directly from the pipe-end and after satisfying the minimum requirements of all concerned, keeps overflowing...

The extention of this scheme from Koirala Khata to Dum Khata and Thamar is non-functional due to broken pipelines.

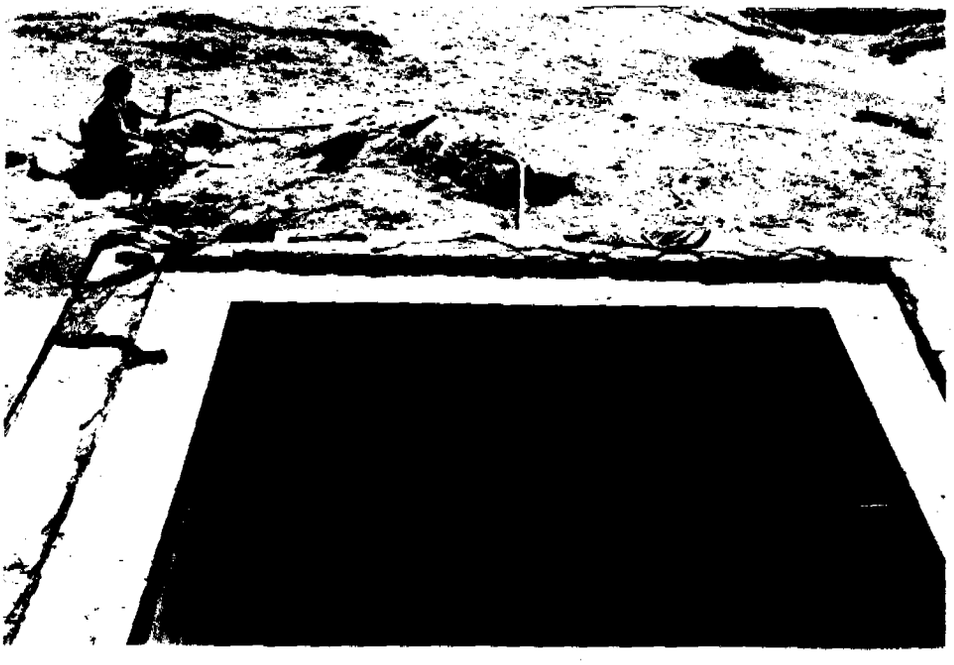
All these 21 households have access to plenty of water from gadheras adjacent to their homesteads and every field is irrigated.

The scheme would need to be repaired by placing a cover on the tank, arranging for the water to travel through the filter chambers and collect in the stock tank. The extention of the pipeline to Thamar also needs to be re-fixed and three stand-posts would need to be constructed.

But more than simple repairs of one scheme, it is essential to motivate these isolated communities to maintain the natural water resource base around their homesteads. It is not impossible for schemes based on the overflow of these gadheras to be affected adversely, 300 meters downstream.

Some of the photographs which follow are quite revealing...

For us it is a curious arrangement to discover the stock tank on top of Koirala Khata, where the water supply bypasses the tank and gushes out of a pipe-end but for the local people it is pure travesty of their faith in development itself



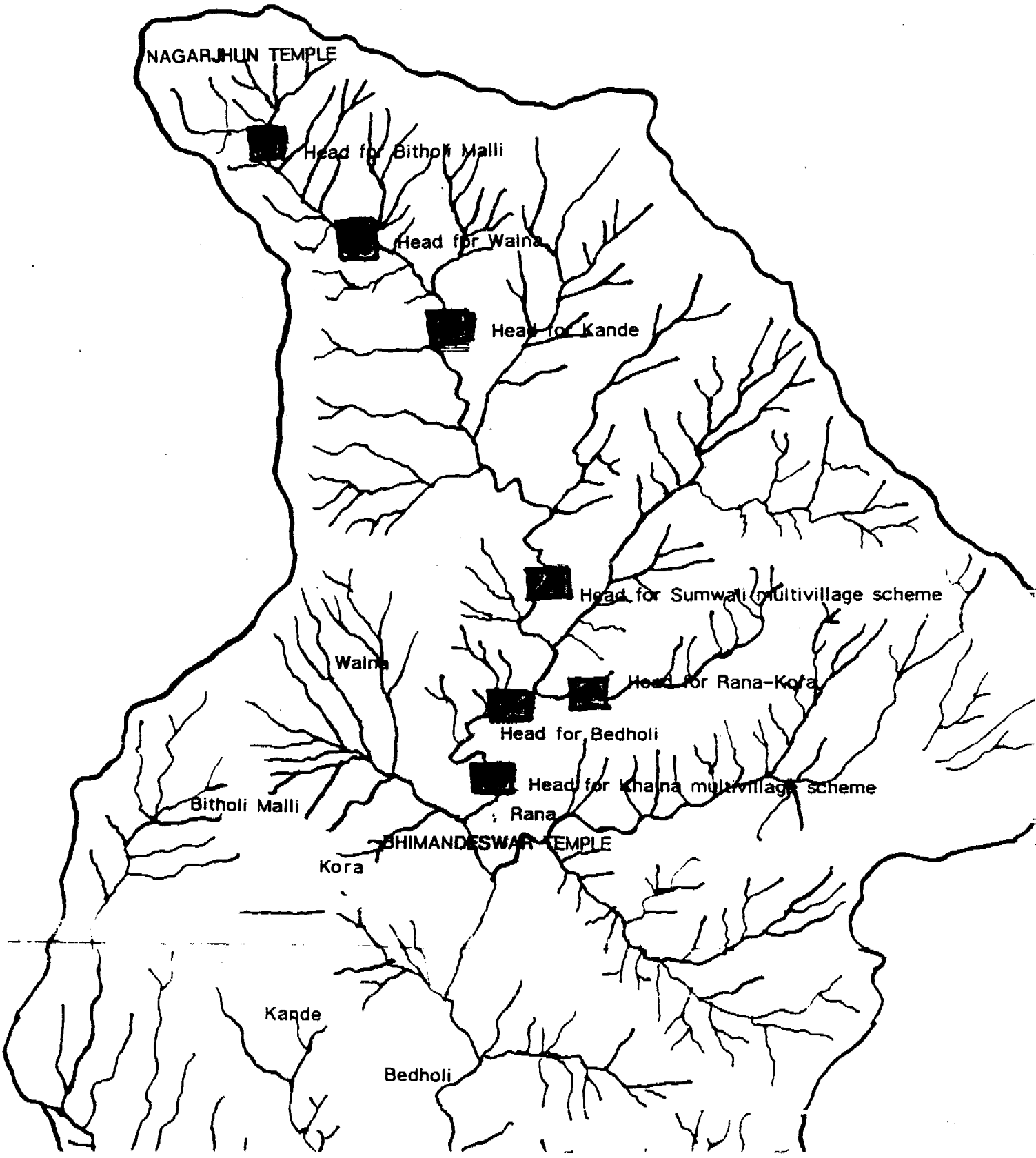
This spring at 1600 meters is located adjacent to the three households of Ganola Khata, Tumri. It is responsible for providing sufficient irrigation waterto several fields...the mustard crop in all these small hamlets were flowering in late December, while in villages across the Riskan, crops were waiting for the winter rains. Through an old arrangement of 'lease' the forest department has allowed these folks to use the waters of the natural springs in this area.

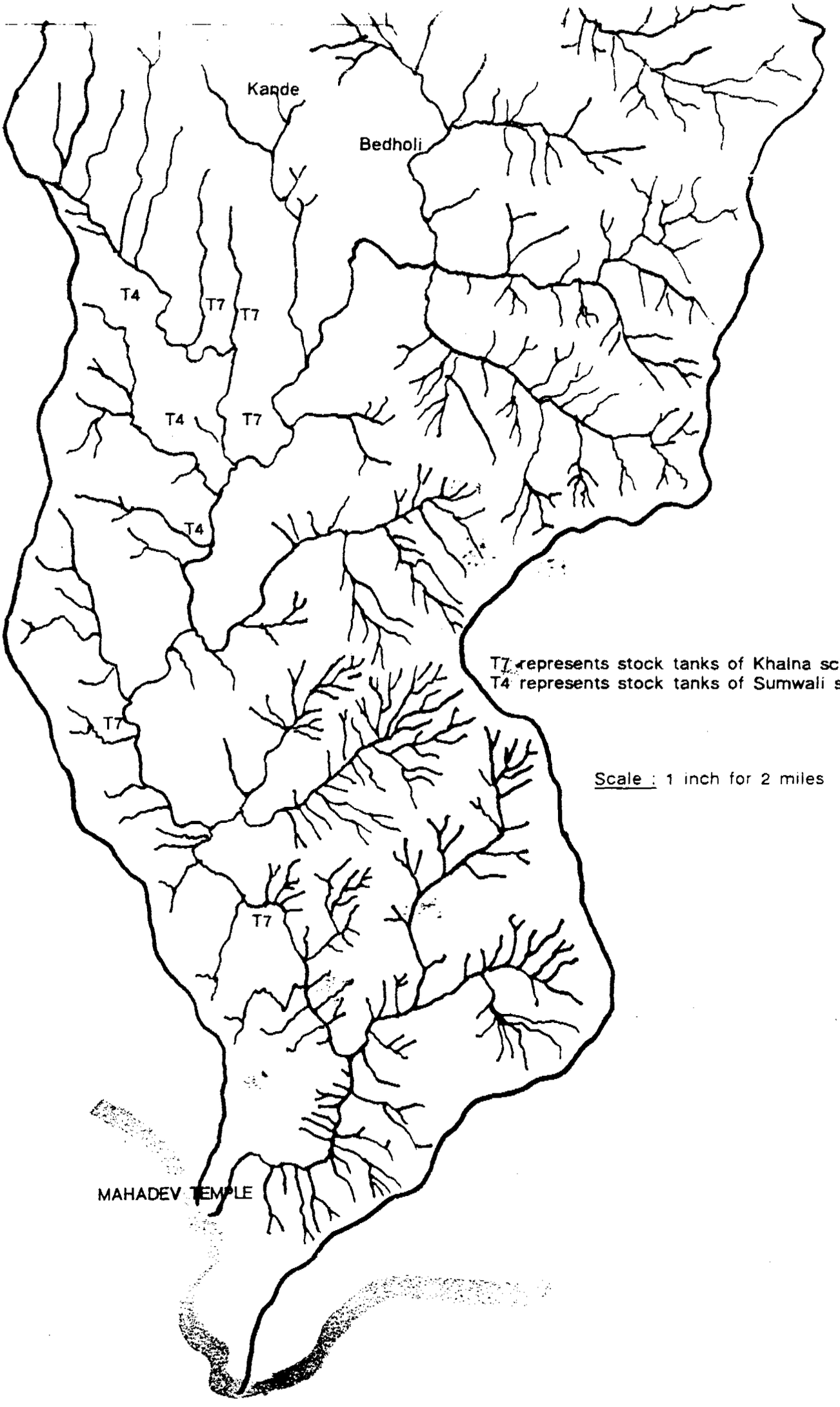
For the past century, the people have been enjoying this benefit and the junior staff of the forest department are busy policing the extraction of pine resin and timber. The state of the reserve forest, at a critical zone where the Riskan originates, leaves much to be desired.

Yet another symbol of neglect....this grand old naula needs no words to describe its state...the road is a few meters over it, with malba liberally dumped all around...now the overflow of this naula is used for irrigating a few fields of Ganola Khata, Tumri.

It is imperative to look into this area more holistically than simply for water supply schemes or commercial forestry. Conservation of natural resources is a foreign concept currently.

WATERWAYS OF RISKAN & MAIN WATER SUPPLY SCHEMES




Kande
Bedholi
T4
T7
T7
T4
T7
T4
T7
T7
MAHADEV TEMPLE
T7 represents stock tanks of Khalna scheme
T4 represents stock tanks of Sumwali scheme
Scale : 1 inch for 2 miles

COMMUNITY FORESTRY

It is almost impossible to address the problem of natural resource management in the Gagas sub watershed on the main stem of the Gagas river. Small watersheds consisting of one or two villages ought to be the basic unit of focus. The intimacy of the smallest watersheds is the key to their restoration.

It is clear that the carrying capacity for the Riskan watershed is in poor condition. The ratio of croplands to common support area is less than 1 : 2 whereas conservation principles require seven hectares of forest cover to support sustainable farming over one hectare.

Not only is the ratio skewed but the state of the commons is a tale by itself!! Of the 2376 hectares of commons spread over thirty one villages for instance, 858 hectares belongs to the van panchayats. The bulk of the village commons, the remaining 1518 hectares, are described as civil benap land and comes under the purview of the revenue department.

It would be imperative to initiate community forestry efforts to restore a decent vegetal cover for at least 1000 hectares of such commons. Through a decentralised ecorestoration strategy it would imply that a typical watershed unit or village community would need to focus on reforesting 30-40 hectares. Over a period of five years it would be quite possible for village groups, such as the van panchayats, to manage such responsibilities. Basically, van panchayats would need to be provided with the wherewithal to initiate and comprehensively complete the reforestation task at their respective levels.

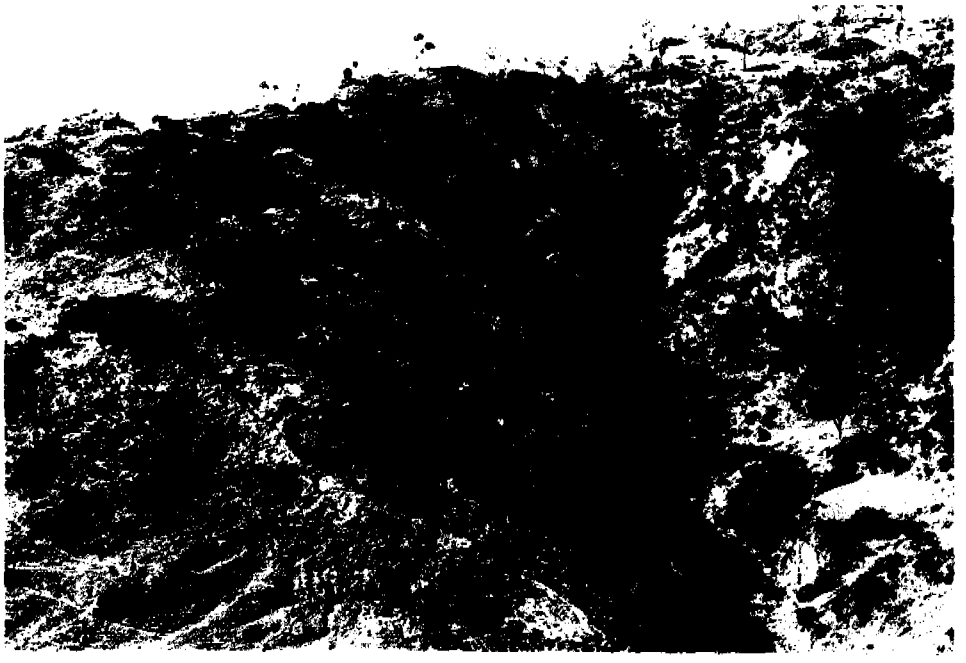
It is envisaged that external inputs would account for only ten percent of the total fund outlay of community forestry efforts. Which implies that local employment generation would receive a tremendous boost. In fact, mandays to the order of 145,000 would be required for raising seedlings, digging pits, planting and maintaining seedlings and related soil and moisture conservation activities. For each unit, whether it is described as the smallest watershed or a village, it would mean generation of about 2000 mandays every year for three consecutive years. In terms of money, it would mean earnings to the tune of Rs. 65,000 per village per year. It is quite likely that villagers involved with community forestry activities directly and earning some supplementary incomes would be the first families in their villages to opt and pay a portion of the installation costs of biogas units.

The programme ought to be initiated in three different zones during Year 1 - a few villages in the upper catchment of Riskan, some located in the mid-section around the Bhimandeswar valley and a few hamlets towards the mouth of the Riskan. During Year 2 and Year 3, efforts ought to be directed towards consolidation or motivating neighbouring communities to join forces for re-foresting their commons.

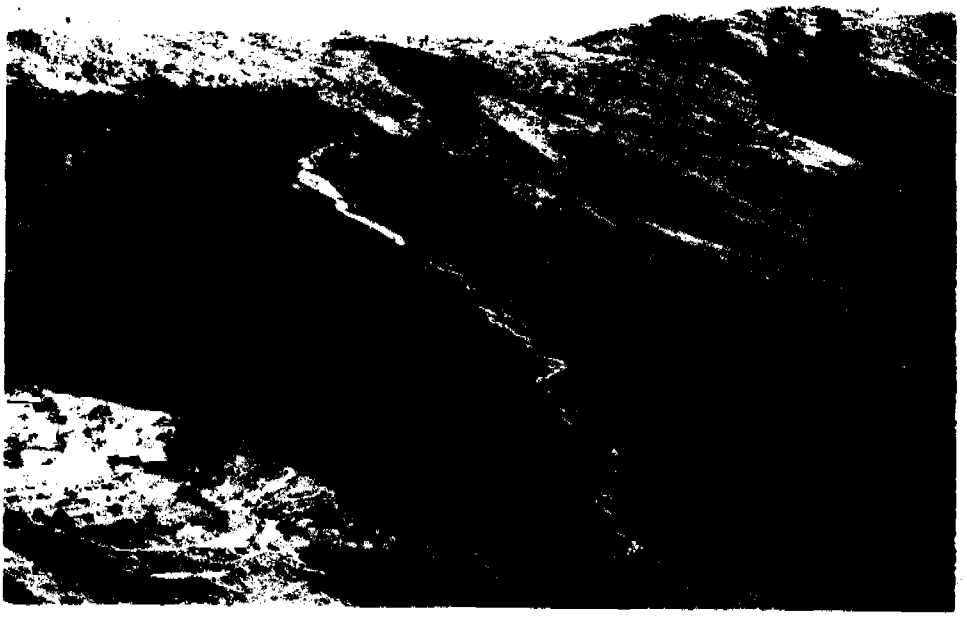
LANDUSE PATTERN

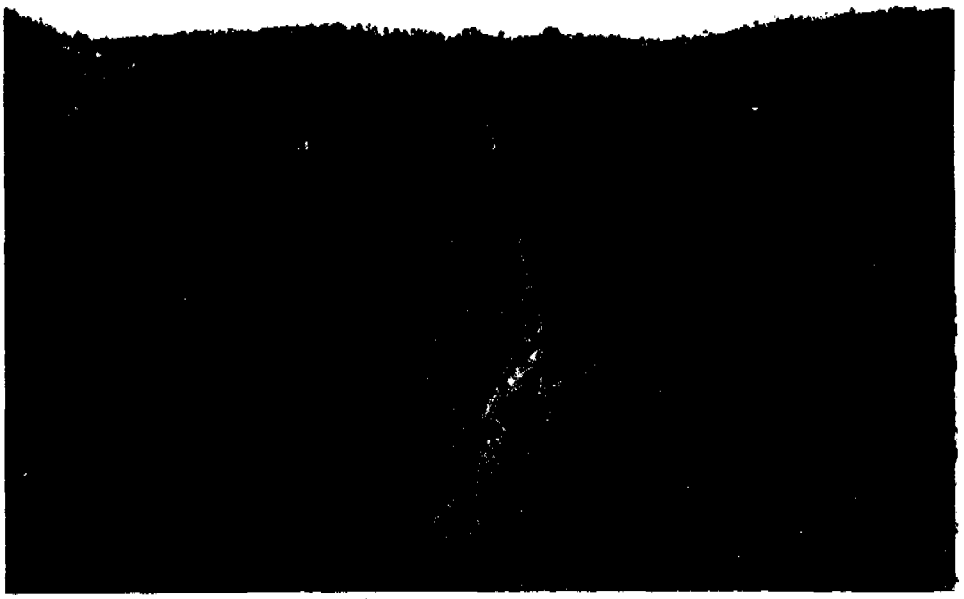
Hectares

	Village	Croplands	Van Panchayat	Civil Benap	COMMONS
1.	Chamni	55	52	60	112
2.	Kunsiari	111	38	18	56
3.	Painauli	32	–	1	1
4.	Baskania	22	11	3	14
5.	Khalna	51	16	67	83
6.	Paithani	61	92	168	260
7.	Naini	43	15	55	70
8.	Sumwali	29	4	49	53
9.	Bitholi Talli	42	26	57	83
10.	Simalgaon	43	34	66	100
11.	Bedholi	27	–	10	10
12.	Banoli	82	–	29	29
13.	Gubtali	19	–	12	12
14.	Raun-Patal	71	–	42	42
15.	Kahali Talli	60	29	67	96
16.	Mainoli	36	47	6	53
17.	Kahali Malli	67	–	14	14
18.	Rana	40	22	16	38
19.	Dhargaon	9	26	2	28
20.	Gawar	14	64	96	160
21.	Kotila	5	–	23	23
22.	Bhumkia	15	–	9	9
23.	Bayala	67	72	105	177
24.	Dabhar	4	–	3	3
25.	Tumri	10	–	7	7
26.	Nar	27	152	96	248
27.	Phalduri	47	–	46	46
28.	Walna	92	60	85	145
29.	Kande	85	56	149	205
30.	Bitholi Malli	91	18	82	100
31.	Ganoli	93	24	75	99
		1450	**858**	**1518**	**2376**



Scrub land like this surround Paithani (top) and it would take years of hard work to raise a rare bit of forest (below) near Bhimandeswar





Community forestry efforts ought to be a critical action item for at least one decade.....wasted lands of Dhargaon (top) and Kande (below)

The genesis of promoting Pinus spp. in these parts is certainly linked to the gains of commercial exploitation associated with this species, for over a century. The business of dealing with resin from pine trees is controlled entirely by the forest department of the state government.

During a typical financial year, just one forest range, is responsible for wounding over 100,000 pine trees. In order to collect, through a contractual arrangement, forty truck-loads of resin, worth Rs. 5 million.

It is imperative to re-orient forestry working plans on an urgent basis; especially for fragile catchment basins. For example, in the Dwarahat Forest Range, which spreads over 15,000 hectares, the headwaters of Riskan are located within only 500 hectares. This critical zone of 500 hectares, defined below, ought to be protected from any sort of exploitation so that the hill slopes are permanently crowned with grand old stands of trees, which would reduce surface runoffs.

BEAT 1	BEAT 2
Compart # 13 : 72 hectares	Compart # 11 : 83 hectares
Compart # 14 : 52 hectares	Compart # 12 : 85 hectares
Compart # 15 : 53 hectares	Compart # 17 : 51 hectares
Compart # 16 : 75 hectares	Compart # 18 : 21 hectares
252 hectares	240 hectares

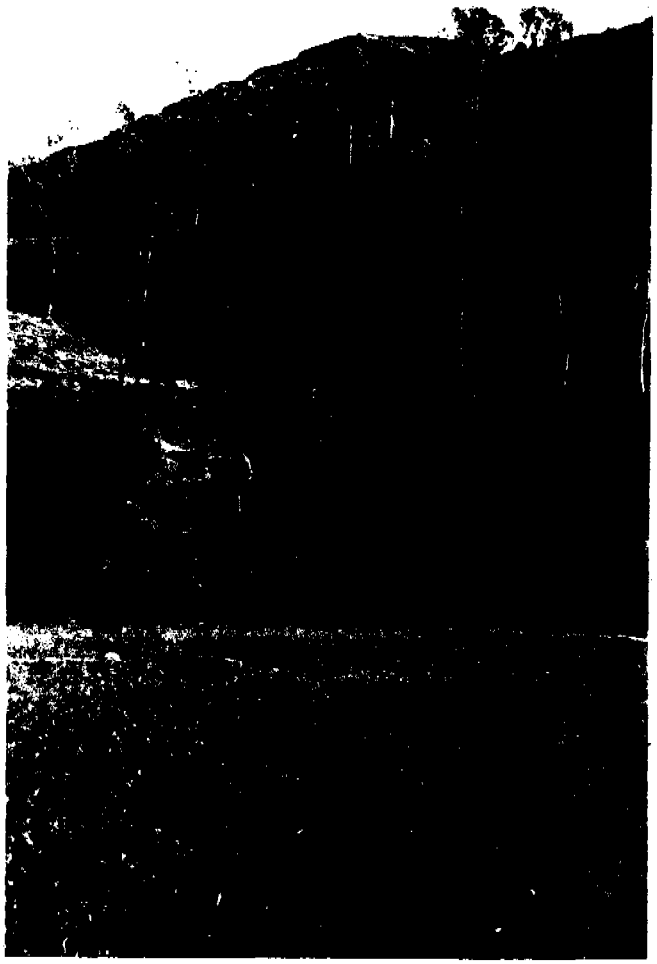
Departmental nurseries, even within the upper catchments of Riskan, are raising thousands of in-appropriate tree species, like the acacia, eucalyptus and pine. Precious water, from a small tributary of Riskan, near Baleswar temple, is diverted into one such nursery, shown above.

Even after nearly ten financial years, the immediate areas around the nursery do not appear to be crowned with much glory!. On a wintry late December morning, we were sweating in its nauseating micro climate.

It is a humiliating experience to meet young and old graziers and listen to their stories of acute water and biomass shortages, while walking through departmental plantations.

The two pictures on the following page reveal some sections of such wasted catchment areas.

The top photo shows the nursery in the left corner, while the bottom photo describes a typical section of twisted pine tree plantations.



It may be completely un-scientific to report an old lady's tale
that their naula over the mustard field dried-up over the past decade
since the days of planting eucalyptus dawned in their Bhimandeswar valley

APPROPRIATE TECHNOLOGY APPLICATIONS

It is already well understood that several appropriate technology applications, location specific to Riskan, ought to be promoted in a comprehensive manner, especially in view of the crisis regarding biomass availability, water and environmental sanitation.

The following action items are being proposed:

1. Installation of biogas units in 600 households, in order to reach 30 percent of the total population, and thereby actually affect a reduction of the increasing pressure on scarce forest resources, viz., firewood. This activity is envisaged to have a direct effect in reducing the drudgery for women as biogas units of 2 cubic meters capacity would be able to provide four hours of cooking gas daily. Domestic animal dung to the tune of 40-50 kgs would be required per day per unit. The livestock survey of December 1993 clearly indicates the availability of animal dung.

2. Motivating people to install low-cost twin-pit sanitary latrines, with the idea of protecting at least fifty percent of the households. It is proposed to install 900 such facilities. Besides benefiting individual families this activity would also ensure drastic reductions in the spread of bacterial contamination of the primary water resources.

3. Rainwater harvesting is an esoteric concept currently and would need to be introduced carefully at few selected locations. Action research is therefore being proposed for the demonstration of the usefulness of collecting rainwater in 150 locations, viz., homes, schools and other institutions.

4. Action research is being proposed for promoting solar energy devices and tower silos. Solar cookers need to be designed and manufactured by local artisans as there is very little sense in depending on expensive models being marketed currently. With the spread of dairy coops and introduction of improved breeds of cattle it would be appropriate to demonstrate the concept of ensiling green fodder in locally built tower silos. A cool, calm and collected demonstration regarding preservation of green fodder is envisaged with 150 selected members of milk coops.

The systematic introduction of these appropriate technology applications would be the responsibility of local artisans with a desire to form a guild. The artisans guild is envisaged to be a critical component and specialised training inputs would need to be organised for creating a viable guild.

Using lantana sticks and cowdung cakes for cooking certainly denotes 'the end of living...beginning of survival' in the Riskan watershed

ANNUAL FIREWOOD REQUIREMENTS

	Village	Households	FW Consumption quintals/year	Support Area Needed hectares
1.	Chamni	56	1792	51
2.	Kunsiari	83	2656	76
3.	Painauli	13	416	12
4.	Baskania	11	352	10
5.	Khalna	71	2272	65
6.	Paithani	86	2752	79
7.	Naini	60	1920	55
8.	Sumwali	12	384	11
9.	Bitholi Talli	50	1600	46
10.	Simalgaon	28	896	26
11.	Bedholi	50	1600	46
12.	Banoli	60	1920	55
13.	Gubtali	25	800	23
14.	Raun-Patal	38	1216	35
15.	Kahali Talli	86	2752	79
16.	Mainoli	42	1344	38
17.	Kahali Malli	29	928	27
18.	Rana	39	1248	36
19.	Dhargaon	14	448	13
20.	Gawar	144	4608	132
21.	Kotila	83	2656	76
22.	Bhumkia	45	1440	41
23.	Bayala	28	896	26
24.	Dabhar	14	448	13
25.	Tumri	16	512	15
26.	Nar	25	800	23
27.	Phalduri	41	1312	38
28.	Walna	52	1664	48
29.	Kande	109	3488	100
30.	Bitholi Malli	124	3968	113
31.	Ganoli	113	3616	103
		1647	**52704**	**1511**

1. Firewood (FW) consumption is to the order of at least 32 quintals per household per annum.
2. Support areas, viz., village commons and reserve forests, are expected to yield 35 quintals of firewood per hectare, as annual incremental growth, provided such areas actually have a decent canopy.

COST ESTIMATE OF A TYPICAL BIOGAS UNIT

2 cubic meters capacity : 4 hours cooking gas daily

		Rupees
A. Materials		
1. Bricks	1000	850
2. Cement	15 bags	1650
3. Stonechips	25 bags (50 cft)	300
4. Sand	35 quintals	350
5. PVC pipe of 4" dia.	6 feet	100
6. Iron bars of 6 mm	15 kgs	180
7. Paint	1 litre	100
8. G.I. pipe of 0.5" dia.	60 feet	600
9. Unions, bends, gate valves, T joint, etcetera		225
10.Cooking stove		435
		4790
B. Transport by truck upto roadhead for 72.5 quintals		1595
C. Mandays		
1. For excavation	10	400
2. For headloading (72.5 qtls)	17.5	700
3. For assisting artisans	7.5	300
4. Artisans Fee	On turnkey basis	2000
		3400

Grand Total of A to C : Rs. 9785

NOTE

1. Programme funding ought to bear the costs projected as items A and B which amounts to Rs. 6385, say Rs. 6500.

2. Farmers are envisaged to bear the costs projected as item C which amounts to Rs. 3400, say around 35 percent of the total.

INSTITUTIONAL ARRANGEMENTS

It is well understood that the natural resource base of the Riskan watershed and at least a dozen other adjoining drainage basins of the Gagas sub watershed have shrunk to extents which are unable to support even subsistence hill farming systems. The grey zones which remain to be addressed significantly are regarding the need for swift spread of appropriate technologies which would be able to restore the life-support systems and more importantly, the organisation of feasible local bodies, who could be enabled to shoulder the task of ecorestoration.

During the course of the proposed programme implementation period of five years, the central theme ought to be the organisation of communities spread over the Riskan and support appropriate tributaries of local energy, for the creation of viable self-help groups.

It is envisaged that the following self-help groups would need to be promoted within the Riskan :

1. Artisans Guild for smooth spread of appropriate technology applications
2. Van Panchayats for restoring the impaired commons
3. Small-credit Groups for enabling the poorest to participate in the change-
4. Water Supply Team for management of piped water supplies

In the earlier Pilot Programme Proposal of October 1993, the artisans guild, van panchayats and small-credit groups have been discussed. The proposed Water Supply Team for management of piped water supplies is a concept which needs some elaboration.

During the recent survey of all the existing piped water supply schemes in the Riskan, it was clearly evident that local people were trying their best to manage the water distribution system. Whether it was at Kunsiari where the gram pradhan has been operating as the 'linesman' for the past fifteen years or at Kotila where the old scheme of 1957 was still functioning most efficiently.

The main problem which needs to be addressed is regarding the formalisation of a viable local process whereby piped water supplies could be managed entirely by the people for all times to come. The example of Kotila ought to be the source for drawing inspiration while systems are developed for the multi-village schemes. Take the example of the Khalna multi-village scheme where four villages stock water prior to Khalna. In three of these villages people were mis-using scarce piped water for irrigating kitchen gardens while Dhura and Khalna were waiting for water to reach up to their tanks. Only Khalna has an informal arrangement of a 'linesman' who is meant to operate the system. Obviously the arrangement does not work efficiently as the 'linesman' has no authority to regulate the misuse of water upstream.

The same problem exists for the Sumwali multi-village scheme where Sumwali benefits immensely and the stock tank between Jhola and Taya remains empty. Or when the Nainoli folks walk up to the Naini stock tank, block off the flow to Naini and force the water to flow to their village stand-post.

The irony of the situation being that water availability at the distant source is not the problem - there is sufficient water. The problem is clearly the lack of any system for regulating the water flow to the various designated points.

It is therefore proposed to organise the concerned communities to form a coalition which serves their interests. Just as single village schemes are basically operated by the local people, it is proposed to organise a Water Supply Team which would maintain the multi-village schemes. During the initial years of programme implementation it would be required to demonstrate that such a Team assists and nurtures the coalition through regular supplies of water. Once that demonstration takes place, it is possible to introduce the concept of waterflow meters, both at the village level and at the household level. People are quite used to paying the electricity bills regularly and on the same score they could be expected to pay their water cess regularly too. But then the water supplies would need to be streamlined prior to any of the other steps.

The proposed Water Supply Team ought to be developed as a local body which could ultimately provide the necessary infrastructural support to each and every village within the Riskan watershed. Such a Team ought to keep a small store with various essential accessories like gate valves, unions, sockets, taps, etcetera. The present trend of depending on a government department for a minor repair item ought to be changed.

However, creation of such alternative arrangements within the Riskan is certainly an uphill task in the present scenario where group dynamics have reached new depths. Besides, the government has to clearly support the spearheading of such changes, not only at the state capital but more so probably at the local level.

Programme Support Unit

In the ideal world of watershed politics, an umbrella organisation covering a major catchment (Gagas river) would be able to provide :

* Consistency
* Planning
* Support for the many tributaries of local energy

It is envisaged that a local NGO would be able to take on the responsibilties of such a Programme Support Unit. It ought to be clear that the name of the game is developing viable local self-help groups for the holistic management of the Riskan watershed and the Programme Support Unit is merely a catalyst in the process of change.

The Pan Himalayan **Grassroots** Development Foundation could well be the local NGO playing the critical role of an umbrella organisation. **Grassroots** is suitably located to spearhead the programme in Riskan through a carefully selected core team of development professionals. The rationale for **Grassroots** to be involved with the initiation of the Riskan Programme is clear : its vision is to enable people over the entire Gagas sub watershed to spearhead similar efforts over a longer period of fifteen-twenty years. The Riskan Programme would basically be the foundations of sustainable development in the larger Gagas sub watershed.

The direct responsibilities of **Grassroots** would be as follows:

* Mounting a spearhead team for programme implementation
* Community organisation
* Enabling local people to form suitable self-help groups
* Providing training inputs for people at all levels, including educational inputs in order to truly involve young children towards a better future in Riskan
* Preparation of sub project details in a participatory manner
* Interface with concerned government departments, consultants and others

It is also envisaged that the **Programme Support Unit** of the **Indo-Dutch Cooperation** would be the ideal institution for performing some of the other significant roles, viz.,

* Management information systems
* Audit - both physical and financial
* Documentation
* Conducting impact studies on a regular basis

In order to prepare for extention of the Riskan Programme to the other drainage basins it would be in order to involve government policy makers and others with the Riskan Programme right from its inception. It is, therefore, being suggested that a **Programme Review Team** be created for monitoring the progress of the Riskan watershed development programme consisting of the following:

1. Representatives of Riskan
2. District Magistrate, Almora
3. DFOs of Almora (West) and Soil Conservation
4. Representative of the Secretary (Hill Development)
5. Director, Programme Support Unit, Indo-Dutch Cooperation
6. Chairman, Pan Himalayan Grassroots Development Foundation

FINANCIAL REQUIREMENTS

FUNDS REQUIRED FOR REPAIRS OF WATER SUPPLY SCHEMES

Rs. in lakhs

Village	Intake	Filter	Tank	S'posts	Pipeline	Accessories	TOTAL
1. Chamni	0.10	0.10	0.01	0.05	0.10	0.05	0.41
2. Kunsiari	0.15	0.05	–	0.05	0.15	0.05	0.45
3. Painauli	–	–	0.25	0.02	0.05	0.01	0.33
4. Baskania	–	–	0.25	–	0.05	0.01	0.31
5. Khalna	0.05	0.05	–	0.02	0.40	0.05	0.57
6. Dhura	–	–	–	–	0.05	0.03	0.08
7. Simalgaon	–	–	0.05	0.05	0.10	0.05	0.25
8. Bedholi	–	–	0.05	0.02	0.10	0.05	0.22
9. Bari	–	–	–	–	0.10	0.01	0.11
10. Banoli	–	–	0.25	0.03	0.15	0.01	0.44
11. Paithani	–	–	0.50	0.09	0.20	0.05	0.84
12. Naini	–	–	0.05	0.01	0.05	0.02	0.13
13. Rana	0.10	0.10	–	0.02	0.25	0.02	0.49
14. Kora	–	–	0.25	0.10	0.10	0.02	0.47
15. Dhargaon	–	–	0.25	–	0.10	0.01	0.36
16. Walna	–	–	–	0.02	0.20	0.05	0.27
17. Phalduri	0.10	0.10	0.50	0.10	0.20	0.02	1.02
18. Nar	0.02	0.02	0.10	0.05	0.10	0.02	0.31
19. Khagreti	–	–	0.05	0.02	0.05	0.01	0.13
20. Bhumkia	0.10	0.10	–	–	0.20	0.02	0.42
21. Bayala	0.10	0.15	0.25	0.05	0.20	0.05	0.80
22. Bagjewala	0.05	0.05	–	0.03	0.15	0.02	0.30
23. Tumri	0.02	0.02	0.05	0.05	0.15	0.05	0.34
	0.79	**0.74**	**2.86**	**0.78**	**3.20**	**0.68**	**9.05**

Particulars	Y1	Y2	Y3	Y4	Y5	Total
1. Repairs (as above)	6.00	3.05	–	–	–	9.05
2. Reserve Fund	1.00	1.00	1.00	1.00	1.00	5.00
3. Contingency (for item 1)	1.00	1.00	–	–	–	2.00
	8.00	**5.05**	**1.00**	**1.00**	**1.00**	**16.05**

FUNDS REQUIRED FOR INSTALLATION OF HANDPUMPS

Rs. in lakhs

	Village	Handpumps	Amount
1.	Khalna	1	0.20
2.	Sumwali	1	0.20
3.	Mohani	1	0.20
4.	Godi	1	0.20
5.	Paithani	2	0.40
6.	Naini/Nainoli	2	0.40
7.	Taya	1	0.20
8.	Kahali Talli	2	0.40
9.	Kui	1	0.20
10.	Gawar	3	0.60
11.	Phalduri	1	0.20
12.	Walna	1	0.20
13.	Ganoli	3	0.60
14.	Bitholi Malli	2	0.40
15.	Bhumkia	2	0.40
16.	Bayala	1	0.20
17.	Bagjewala	1	0.20
18.	Tumri	1	0.20
19.	Chamni	2	0.40
		29	**5.80**

FUNDS REQUIRED FOR NEW WATER SUPPLY SCHEMES

New water supply schemes are being proposed for the following five villages :

1. Chamni
2. Paithani
3. Gawar
4. Bitholi Malli
5. Ganoli

1. CHAMNI WATER SUPPLY SCHEME

		Rs.in lakhs
* One stock tank of 10,000 litres capacity	@ Rs. 5 per litre	0.50
* Two distribution tanks of 5,000 litres capacity	-do-	0.50
* Filter chamber		0.10
* Pipeline of 1.5 kms	@ Rs. 60 per meter	0.90
* Distribution pipes of 700 meters	@ Rs. 40 per meter	0.28
* Stand-posts (four)	@ Rs. 1000	0.04
* Accessories		0.05
* Installation charges		0.71
	Total	3.08

2. PAITHANI WATER SUPPLY SCHEME

* One stock tank of 10,000 litres capacity	@ Rs. 5 per litre	0.50
* Intake and filter chambers		0.15
* Pipeline of 2 kms	@ Rs. 60 per meter	1.20
* Distribution pipes of 1000 meters	@ Rs. 40 per meter	0.40
* Stand-posts (six)	@ Rs. 1000	0.06
* Accessories		0.05
* Installation charges		0.71
	Total	3.07

3. GAWAR PUMPED WATER SUPPLY SCHEME — 15.00

At this stage only a lump sum estimate is being incorporated.
For 736 people the per capita costs would be around Rs.2000.

4 & 5. BITHOLI MALLI AND GANOLI — 20.00

Once again a lump sum estimate is being incorporated.
For 1159 people the per capita costs would be around Rs.1700.

TOTAL FOR ALL SCHEMES Rs. 41.15 lakhs

TOTAL FUNDS REQUIRED FOR UPGRADING WATER SUPPLIES

Rs. in lakhs

	Particulars	Y1	Y2	Y3	Y4	Y5	Total
1.	For repairs of old schemes	8.00	5.05	1.00	1.00	1.00	16.05
2.	For setting-up new schemes	35.00	6.15	-	-	-	41.15
3.	For installing handpumps	1.00	2.00	2.80	-	-	5.80
4.	For maintenance	1.50	1.50	1.50	1.50	1.50	7.50
5.	For contingencies	5.00	3.00	2.00	1.00	1.00	12.00
		50.50	**17.70**	**7.30**	**3.50**	**3.50**	**82.50**

NOTE

It is envisaged that the proposed Water Supply Team would consist of a group of 10-12 experienced 'linesmen'. This Team would be responsible for smooth water supplies in all the concerned villages within the Riskan. At every point, villages which are already able to manage water supply schemes, like Kotila, would be encouraged to continue in the same fashion. THe proposed Team is basically for villages with supplies from multi-village schemes.

In all likelihood, it would be necessary to select 2-3 men for managing the water supplies for all villages located at the mouth of Riskan, similarly about 4 men would be necessary for villages located in the Bhimandeswar valley and the side-flanks, and another 4-5 men would be required for all those villages which are located in the upper catchment of Riskan. The most important and strategic placement/selection of such men would be for the upper catchment as seven main schemes have its 'head' located therein.

It is hoped that through an effective demonstration of systematic management of water supplies, for a period of 1-5 years, the people of Riskan would quite naturally come forward and bear the annual maintenance costs, based on the usage of water, for each household and village. (People are paying for services which benefit them, viz., electricity, flour-mills, public transport, etcetera.)

FUNDS REQUIRED FOR COMMUNITY FORESTRY & SOIL CONSERVATION

Rs. in lakhs

	Particulars	Y1	Y2	Y3	Y4	Y5	Total
1.	Commons (hectares)	200	400	400	–	–	1000
2.	Seedlings (lakhs)	3.20	6.40	6.40	–	–	16.00
	Rs. in lakhs	12.80	25.60	25.60	–	–	64.00
3.	Grass nurseries	1	2	2	2	2	2
	Rs. in lakhs	0.10	0.20	0.20	0.20	0.20	0.90
4.	Bamboo nursery	1	1	1	1	1	1
	Rs. in lakhs	0.30	0.20	0.15	0.15	0.15	0.95
5.	Bioengineering	2.00	2.00	2.00	–	–	6.00
6.	Fencing loan	4.00	4.00	2.00	–	–	10.00
		19.20	32.00	29.95	0.35	0.35	81.85

NOTE

1. For reforestation of the degraded commons, 1600 seedlings per hectare would be required. From the stage of raising these seedlings to its planting and maintenance, for a period of three years, funds to the tune of Rs. 4 per seedling is being projected. The break-up of utilising Rs. 4 per seedling, over three years, would be as follows:

	Y1	Y2	Y3	Total
* Raising seedlings	100	–	–	100
* Pitting	50	–	–	50
* Headloading seedlings from nurseries	20	–	–	20
* Manuring of commons	20	10	10	40
* Weeding of seedlings	10	15	15	40
* Watering seedlings	20	20	20	60
* Mulching seedlings	10	10	10	30
* Watch/Management	20	20	20	60
IN PAISE	250	75	75	400

2. Therefore, funds projected for items 1 and 2, under Y1, would actually be utilised till Y3. And, similarly, funds for Y2 would be used till Y4, etcetera.

FUNDS REQUIRED FOR APPROPRIATE TECHNOLOGY APPLICATIONS

Rs. in lakhs

	Particulars	Y1	Y2	Y3	Y4	Y5	Total
1.	Biogas units	100	100	150	150	100	600
	@ Rs. 6500	6.50	6.50	9.75	9.75	6.50	39.00
2.	Sanitary latrines	100	150	200	200	250	900
	@ Rs. 2500	2.50	3.75	5.00	5.00	6.25	22.50
3.	Rainwater harvesting	10	20	30	40	50	150
	@ Rs. 10,000	1.00	2.00	3.00	4.00	5.00	15.00
4.	Solar energy devices	0.50	1.00	1.00	1.00	1.00	4.50
5.	Fodder silos	10	20	30	40	50	150
	@ Rs. 2500	0.25	0.50	0.75	1.00	1.25	3.75
6.	Revolving fund	1.00	1.00	-	-	-	2.00
		11.75	**14.75**	**19.50**	**20.75**	**20.00**	**86.75**

FUNDS REQUIRED FOR TRAINING OF LOCAL GROUPS

1.	Artisans Guild	0.50	0.50	0.30	0.20	-	1.50
2.	Van Panchayats	0.50	0.50	0.50	-	-	1.50
3.	Small-credit Groups	0.50	0.40	0.40	0.20	-	1.50
4.	Water Supply Team	1.00	1.00	0.50	0.30	0.20	3.00
5.	Farmers Orientation	0.50	0.50	0.50	0.50	0.50	2.50
		3.00	**2.90**	**2.20**	**1.20**	**0.70**	**10.00**

FUNDS REQUIRED FOR THE PROGRAMME SUPPORT UNIT

Rs. in lakhs

A. The Spearhead Team	Y1	Y2	Y3	Y4	Y5	Total
1. Programme Director	0.85	0.85	0.95	0.95	1.00	4.60
2. Community Coordinator	0.70	0.70	0.80	0.80	0.80	3.80
3. Development Assistants (2)	0.50	0.50	0.60	0.60	0.80	3.00
4. Engineering Assistant	0.50	0.50	0.70	0.70	0.70	3.10
5. Accounts Assistants (2)	0.50	0.50	0.60	0.60	0.80	3.00
6. Driver	0.15	0.15	0.20	0.20	0.25	0.95
	3.20	**3.20**	**3.85**	**3.85**	**4.35**	**18.45**
7. Propulsion	0.60	0.60	0.80	0.80	1.00	3.80
8. P & T, Telephone, Fax	0.40	0.40	0.45	0.45	0.50	2.20
9. Rents	0.40	0.40	0.40	0.40	0.40	2.00
10.Audit	0.25	0.25	0.40	0.40	0.60	1.90
11.Films & Processing	0.20	0.20	0.20	0.20	0.20	1.00
12.Training aids	0.20	0.20	0.20	0.20	0.20	1.00
13.Study tours & consultancies	1.00	1.00	0.50	0.50	0.50	3.50
	3.05	**3.05**	**2.95**	**2.95**	**3.40**	**15.40**
B. Other Support Items						
14.Camera/slide projector	0.50					0.50
15.Waterflow meters/raingauges	0.50					0.50
16.Height finder	0.10					0.10
17.Photocopier	0.60					0.60
18.Word processor (bi-lingual)	0.60					0.60
19.Jeep & trailer	2.50					2.50
	4.80					**4.80**
Total of A and B	**11.05**	**6.25**	**6.80**	**6.80**	**7.75**	**38.65**

CONSOLIDATED STATEMENT OF FUNDS REQUIRED

Rs. in lakhs

	Y1	Y2	Y3	Y4	Y5	Total
A. Programme Components						
1. Upgrading Water Supplies	50.50	17.70	7.30	3.50	3.50	82.50
2. Community Forestry	19.20	32.00	29.95	0.35	0.35	81.85
3. Appropriate Technologies	11.75	14.75	19.50	20.75	20.00	86.75
4. Training of Local Groups	3.00	2.90	2.20	1.20	0.70	10.00
	84.45	**67.35**	**58.95**	**25.80**	**24.55**	**261.10**
B. Programme Support						
5. Spearhead Team	6.25	6.25	6.80	6.80	7.75	33.85
6. Support Items	4.80	-	-	-	-	4.80
	11.05	**6.25**	**6.80**	**6.80**	**7.75**	**38.65**
TOTAL OF A and B	95.50	73.60	65.75	32.60	32.30	299.75

say, Rs. 300 lakhs spread over five years

CONCLUDING REMARKS

It is clear that the proposed programme is a comprehensive effort to break new frontiers in terms of not just upgrading water supplies in remote hilly areas but more importantly, for demonstrating the feasibility of enabling local groups to gather the confidence of managing the natural resource base. Ultimately, the people of Riskan are truly the custodians of the forests and streams, the birds and the bees.

If the Riskan Programme manages to succeed, which is not an easy or simple task by any standards, then it would have laid the foundations for a much more comprehensive effort required for ecorestoration of the entire Gagas sub watershed. The programme, therefore, would attempt to demonstrate that a coalition exists between the interests of the people and conservation of the natural resource base in the Himalayas.