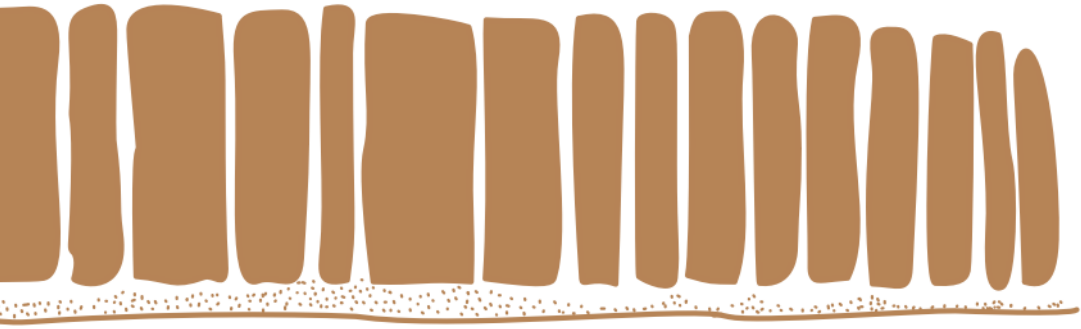
Rapid Assessment Report

Naubad Karez



Rapid Assessment Report

Naubad Karez

Covering previous conservation efforts, current conditions and urban takeover.

The rapid assessment of Naubad Karez line in Naubad area, Bidar city was conducted to identify the current changes on the ground. The goal is to secure the time and resources necessary to develop refined, up-to-date, and more comprehensive condition assessment documents in near future. This document will aid and support the creation of a new proposal relevant to the present conditions and changes for the full restoration and conservation of the Naubad Karez. A team made multiple visits to the mouth of the Karez, the air vents at various locations, and the Naubad tank. During these visits, we made observations, took field notes, photographed the vents, and marked their locations, all of which helped us describe the current condition of the Karez line.

Collaboration: Team YUVAA, Living Labs Network & Forum, Aruvu Collaboratory

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This booklet was designed and printed at Aruvu Collaboratory (Yelahanka Nodal Center). The document is typeset in Sitka and Tahoma. Copies of this report can be found in Yelahanka Nodal Center and Bidar Nodal Center.

This report is published by **LLN Press**

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Aquifers and its relevance in Bidar

Aquifers are underground layers of water-bearing materials that are not visible most of the time. They naturally filter the water flowing through them. Geographically the Bidar taluk has northern lowlands and southern highlands situated on laterite sub-strata on a bed of basaltic rocks[1].

Bidar is primarily a rain-fed semi-arid region with extreme summers, with agriculture (major source of livelihood) predominantly dependent on the region's rain-fed aquifers. The region has two cropping seasons: Kharif and Rabi. Sugarcane, a water-intensive crop, is a major commercial crop in the district. Other principal crops grown in the area include jowar, tur, horse gram, black gram, green gram, Bengal gram, and wheat. Seventy-six percent of the agricultural land is irrigated by bore wells and dug wells, making groundwater a crucial resource for the people of Bidar.

In Bidar, aquifers are very common and serve as vital sources of groundwater for drinking, agriculture, industrial, and other purposes. Before the Karanja irrigation project, open wells and bore wells tapped into these shallow aquifers. The presence of shallow aquifers facilitated the development of water infrastructure, such as the Karez/ Qanat, to support the community's needs.

[1] Davithuraj, J. "Aquifer Mapping and Management Plan: Bidar Taluk, Bidar District, Karnataka." Bengaluru: Central Ground Water Board, 2022.

Water harvesting knowledge in the region

Bidar has a history of pioneering traditional and indigenous water harvesting and distribution systems in the region. Communities residing in this region have relied on such inter-generational knowledge to cope with the semi-arid conditions through conserving and storing water using the geomorphology of the place.

Tanks (kere), A lake, is an often naturally occurring, relatively large and fixed body of water on the Earth's surface. Lakes are typically larger and deeper than ponds.

Step wells (Bharam Bhavi,Kattanki Bhavi) are wells, ponds with a long corridor of steps that descend to the water level. Step wells are examples of the many types of storage and irrigation tanks, mainly to cope with seasonal fluctuations in water availability. The builders dug deep trenches into the earth for dependable, year-round groundwater. They lined the walls of these trenches with blocks of stone, without mortar, and created stairs leading down to the water.

Open Wells of different shapes and sizes are found in every household of Bidar. Water is used for both drinking and household consumption

Houz/Houd are small water storage structures in rectangular shape where in water is stored from pipes or some times rain water water used by livestocks and for household consumptions

Matti Hodayadu, Lifting water from well using cattles and


Elevation, valleys, connecting across the Naubad Urban Area
The Karez cuts across the plateau and connects two agricultural regions on either side of Naubad Junction
Air Vent 1
Mouth of the Karez
Kund
AV 5
AV 2
AV 4
AV 9
AV 3
AV 8
AV 12
AV 7
AV 6
Udgir Road - SH4
Branch AV 3
AV 11
AV 14
AV 15
AV 13
Possible Vent
AV 18
AV 16
AV 17
Branch AV 2
Possible mother well
AV 20
AV 19
AV 21
Branch AV 5
Bidar - Humnabad road
Kolara
Elevation countours of the Bidar Urban Area
>565m
>627m
>641m
>655m
low
higher

Traditional knowledge is collective in nature and is often considered the property of the entire community, and does not belong to any single individual within the community. For many communities, traditional knowledge is inseparable from their cultural values, spiritual beliefs and customary legal systems and is viewed as their intellectual property.

irrigating fields through water channels

Krishi Honda, a current days water harvesting structure in farm a small pond is dug in the farmland to store the rainwater which can be used for irrigation of farmland

According to Chakravarty and Mahajan "Traditional knowledge is collective in nature and is often considered the property of the entire community, and does not belong to any single individual within the community. For many communities, traditional knowledge is inseparable from their cultural values, spiritual beliefs and customary legal systems and is viewed as their intellectual property. Indigenous and local communities have argued in national and international law-making bodies that their knowledge systems should not be used by others, without their consent, as well as arrangements for fair sharing of the benefits. Many multilateral treaties have also been enacted over the last more than 100 years, with nation states enacting the general principles found in such treaties into their own domestic laws"[2]. Step wells, tanks, open wells, and houd are all the tangible proof of the existence of traditional knowledge in the region which has to be conserved and passed on.

[2] Chakravarty, R., & Mahajan, P. (2010). Preserving traditional knowledge: Initiatives in India. IFLA Journal, 36(4), 294–299.

A history of Karez/ Qanats in other regions of the world

Karez system (Qanat in Arabic and Surang Bhavi in Kannada), this system of sloping wells to transfer water from the water table to the surface for drinking and irrigation, dates back around 500 years.The system in Naubad is very similar to Qanat systems found in Iran.v

In Gonabad city of Iran, a 45 km Qanat built more than 2,700 years ago is still in use, providing water to around 40,000 people. This is also the site of the world's oldest Qanat and is recognised by UNESCO as a world heritage site.

Majid L Khanieki, a hydrological expert from Iran, in 2015 asserted that Bidar's Karez system was among the best known underground water systems in the world. Further, he said that though Iran has a history of such water systems but the ones in Bidar seemed to be more complex and aesthetic in structure. Majid, after careful observations on his official visit as a technical advisor through IHCN, concluded that, unlike other Karez/Qanats around the world, which only transport water from one point to another point as a conveyor system, The Karez/Qanats in Bidar actually also help maintain Ground water table and recharge aquifers, and Called it Karezvoir (Karez+Reservoir).

The Karez or Qanat water system has been successful in many arid and semi-arid regions of the world in Asia, Africa and even Europe and Latin America. However, the origin of Qanat technology is said to be in ancient Iran, where the Persians developed it in the early 1st millennium BC. It is said to have spread thereafter, and about 38 countries in the world have such a system. Iran is documented to have had more than 50,000 Qanats in the mid 20th century, and latest estimates say around 35,000 of them are alive. In India, Karez systems are known to have developed during the reign of Islamic dynasties descending from Persia or having influential connections or links with Iranian or Persian engineers. Such systems can be found in Bidar, Vijayapura (erstwhile Bijapur), Pune and Aurangabad (Maharashtra), Burhanpur of Madhya Pradesh and a few other places.

In India, a system that collects and conveys groundwater is called Karez / Kariz / Kharejari / Surang-Bawdi / Nahar / Kundi Bhandara. In Bidar there are three Karez systems which were built in 15th Century ACE during the Bahmani rule which are Jamna Mori, Shukla Theerth and Naubad Karez.[3]

[3] Govindankutty, Valliyil. (2020). A Historic Appraisal of Deccani Karez - Challenges and Prospects.

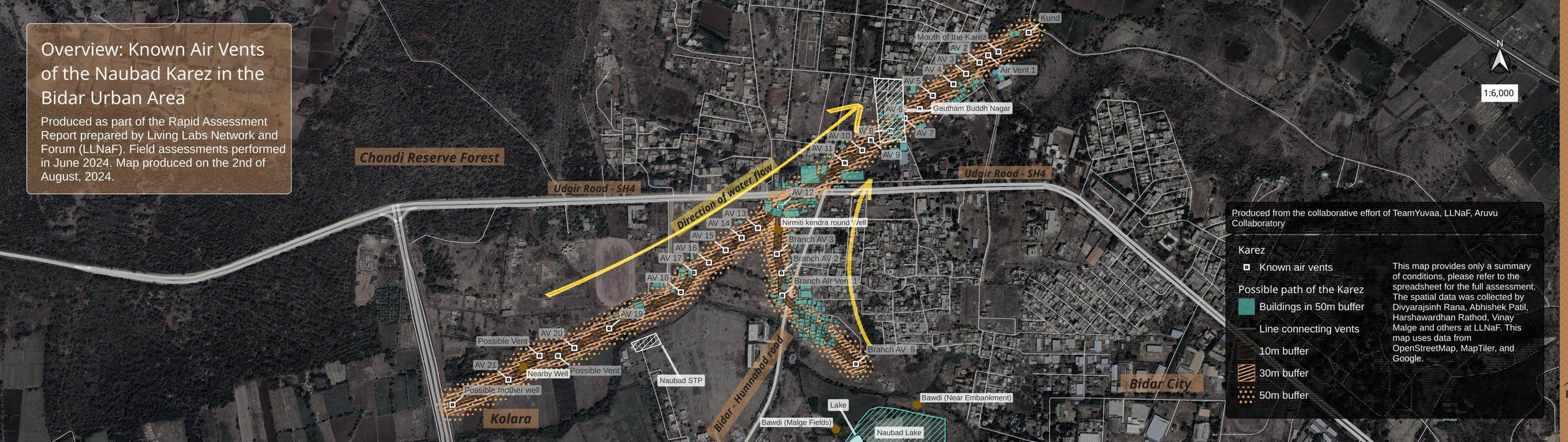
Naubad Karez: Main Line

The Karez/Qanats in Bidar actually also help maintain Ground water table and recharge aquifers, and Called it Karezvoir (Karez+Reservoir).

Bidar's Karez system is said to be the first implemented in India, as the Bahmani Sultanate was the first medieval Muslim kingdom to have prominent links with Persia.

Another Karez line originates from the Naubad tank and joins near the current Chauli Kaman to the Naubad - Aliyabad Karez line. The line from the Naubad tank might extend towards the Chauli, which requires further study. Five vents have been identified along this branch line.

overview map Here (unfolds)


Overview: Known Air Vents of the Naubad Karez in the Bidar Urban Area
Produced as part of the Rapid Assessment Report prepared by Living Labs Network and Forum (LLNaF). Field assessments performed in June 2024. Map produced on the 2nd of August, 2024.
Chondi Reserve Forest
Udgir Road - SH4
Udgir Road - SH4
Direction of water flow
Kund
Mouth of the Karez
AV 2
AV 3
AV 4
Air Vent 1
AV 5
AV 6
Gautham Buddh Nagar
AV 7
AV 8
AV 9
AV 10
AV 11
AV 12
AV 13
AV 14
AV 15
AV 16
AV 17
AV 18
AV 19
AV 20
AV 21
Nirmiti kendra round Well
Branch AV 3
Branch AV 2
Branch Air Vent 1
Branch AV 5
Possible Vent
Possible Vent
Nearby Well
Possible mother well
Naubad STP
Bidar - Humnabad road
Kolara
Bidar City
Lake
Bawdi (Near Embankment)
Bawdi (Malge Fields)
Naubad Lake
N
1:6,000
Produced from the collaborative effort of TeamYuvaa, LLNaF, Aruvu Collaboratory
Karez
Known air vents
Possible path of the Karez
Buildings in 50m buffer
Line connecting vents
10m buffer
30m buffer
50m buffer
This map provides only a summary of conditions, please refer to the spreadsheet for the full assessment. The spatial data was collected by Divyarajsinh Rana, Abhishek Patil, Harshawardhan Rathod, Vinay Malge and others at LLNaF. This map uses data from OpenStreetMap, MapTiler, and Google.
Naubad Karez in the Bidar Urban Area - Map 1
Pull to open

Naubad Karez: Naubad Tank Karez Line

Historic Groundwater Recharging Structure: Naubad Embankment and Reservoir

The Naubad Embankment is part of the historic Karez system created during the Bahmani period in the 15th century. This embankment is significant as it is unique in the Bidar area and serves as a historic groundwater recharging structure. From a geohydrological perspective, the location of the embankment and reservoir is crucial, as it is directly above geological fractures or water movement channels called lineaments. This positioning allows for faster groundwater recharge, helping maintain a high water table in the surrounding neighborhoods.

One of the branches of the Naubad Karez System is also located near this water body, thereby sustaining a high water table throughout the entire Karez system. This ensures a reliable supply of potable water for settlements in the Naubad-Aliyabad area and enables the cultivation of water-intensive crops like sugarcane during the summer. The innovative technique of monitoring water levels through monitoring wells and step wells can be observed inside the Naubad tank and on the embankment.

Branch map Here


Close up view of the Naubad Tank branch
This view contains parts of the condition assessment along with the locations of the air vents.
Gautham Buddh Nagar
AV 10
AV 9
Bidar City
AV 12
Nirmiti kendra round Well
AV 13
Branch AV 3
Branch AV 2
Bawdi (Near Embankment)
Branch AV 5
AV 14
Branch Air Vent 1
AV 15
Naubad Lake
AV 16
Bawdi (Malge Fields)
AV 17
Lake
Bawdi (With Steps)
AV 18
Naubad STP

2012

Proposals for Heritage work across Bidar and revival of the Karez

2016

Revitalization of the Karez after 15-months of intensive cleaning work

2017

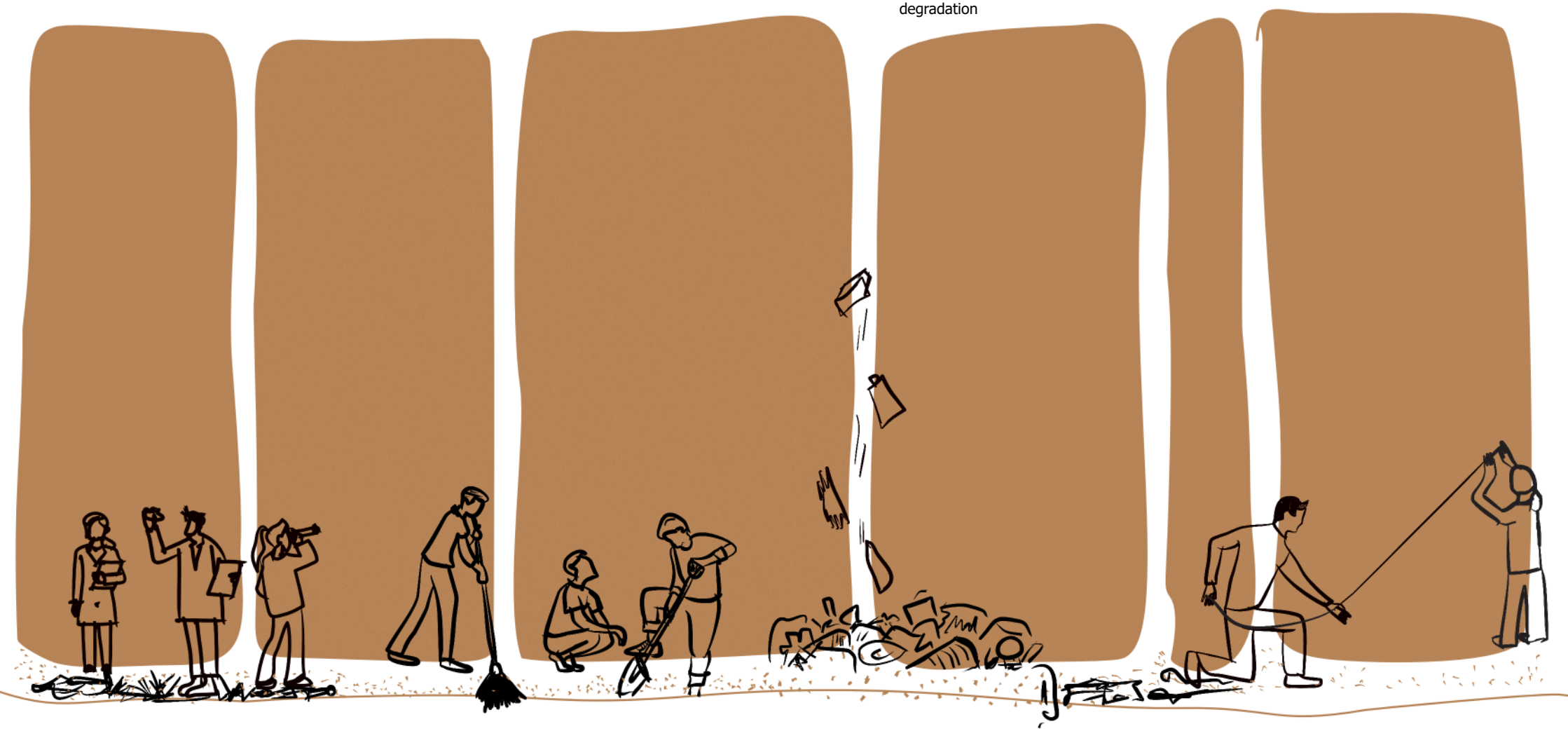
A state of neglect caused by many factors including encroachments and soil degradation

2022

More reports highlighting the importance of acquifiers in the region

2024

Mapping of the buffer zone around the Karez was carried out



Actions taken between 2012-2024

In 2012, the Government of Karnataka initiated several heritage projects in Bidar, focusing on adaptive reuse, restoration, and heritage precinct development. This effort was supported by the Indian Heritage Cities Network Foundation (IHCN). Among these projects, a proposal to revive the Karez system was launched with the support of the Bidar District Administration, which had initially identified it as a canal system.

Following detailed surveys and research, the Bidar Karez system was recognized as a significant heritage asset for Bidar. A proposal for its conservation, rehabilitation, and tourism development was initiated, marking a unique effort in both Karnataka and India.

Preliminary studies by the Conservation Team from IHCN and Deccan Heritage Foundation (DHF) led to a report submitted to Mr. PC Jaffer, the then District Commissioner of Bidar. He approved funds to start cleaning and desilting the Karez Channel, beginning at its first air vent, along with the mouth of the Naubad Karez and the exit channel connecting the mouth to the Kunda (now called Siddeswara Kunda).

Mr. Kunjambu (Deceased), a veteran surangam digger/ maker and water diviner from Kasargod in Kerala, was recruited to initiate the cleaning process and train local well diggers on the proper cleaning methods. The work was supervised by IHCN and DHF, monitored by Team YUVAA NGO volunteers, and executed by M.A. Samad, an ASI contractor, with Nirmiti Kendra, Bidar, as the Nodal Agency under the direct instructions of the District Commissioner of Bidar.

Within six weeks of commencing the work, the second vent was exposed, validating the preliminary report's observations. Shortly thereafter, Dr. PC Jaffer was transferred, and Mr. Anurag Tiwari (Deceased) took over as the new District Commissioner. He showed great interest in continuing the work based on new findings and suggestions from the cleaning efforts. He secured additional funds and resources to expedite the cleaning of the identified air vents.

On September 15, 2016, after 15 months and the removal of thousands of tonnes of garbage, decomposed soil, and silt, the system was revitalized with water filling the entire Karez line and some vents holding significant amounts of water. The outflow was observed, and water filled the Siddeshwara Kunda, subsequently flowing through vegetation and filling streams beyond the connecting road to Aliabad.

Phase 1, which included identifying the line, documentation, and desilting, was successful. However, the second and third phases, involving landscape development, conservation plans, and other steps, never commenced due to a lack of interest from officials and the state government.

Since January 2017, the Naubad Karez has been in a state of neglect. Changes in land use, encroachments in the buffer zone, degradation of vegetation and soil in the

The Naubad Karez has been in a state of neglect. Changes in land use, encroachments in the buffer zone, degradation of vegetation and soil in the catchment boundary, and construction on top of the Karez line have all impacted the proposed development plan.

Post cleaning assessment of the Karez, September 2016

catchment boundary, and construction on top of the Karez line have all impacted the proposed development plan. Incessant borewell drillings, increased traffic volume on roads along the Karez line, and public neglect have further affected the Karez. The STP's wet well, located in a groundwater hotspot along the Karez line, is expected to impact the system in the coming years.

In 2021-2022, the Central Ground Water Board, Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Government of India, conducted and published a study titled "Aquifer Mapping and Management Plan" in Bidar taluk. This report could be an useful reference for future assessments.

Glossary: Assessment of the Air Vents in May 2024

Table 1: Glossary of indicators used to assess

Indicator	Relevance
Clarity of the water	Clarity of water indicates physical health of water & aqautic ecosystems, it can be used for consumption and farming.
Odour	Odour in water indicates seepage of drain, factory waste and other effects on water ecosystem such as odour indication of eutrophication. Indicates potability of water.
Vegetation	Clear segregation of native and invasive vegetation along vents is important as it affects the ecosystem above and below the ground, mapping of vegetation relevant for karez and surrounding area will be helpful in maintaining the ecosystem. eg:- (lantena and eucalyptus invasive species has adverse effects on ecosystem) & on the right side of siddehwara temple we see landside in smaller patches, here study of vegetation becomes important as it helps us in knowing vegetation (grasses or shrubs) which can be help in sustainance of terrain.
Land use	Land usage along the karez line becomes important due to continous change in land use, which has direct and indirect impact on the air vents. eg:- farming,urbanisation, garbage dump etc.
Usage of Water	Along the systems water usage varies examples include usage for farming, drinking & for live stocks.
Accessibility	Accessibility of vents becomes important for maintainence, for any intervention and effective monitoring to happen.
Farming	Usage of pesticides, insecticides & manures impacts both physical & chemical properties of land. Due to leaching or seepage of chemicals in water it has adverse effects on aquatic ecosystems further affecting people and livestock usage.
Encroachment	Encroachment on karez buffer zone area & even on govt lands adds further pressure on the well-being of karez.
Collapse	In some of the vents there is collapse of stone lining , there might be chances of well collapsing and it might effect the links between the well & addition of silt on regular basis. This effects flow.
Caving In	Breaches in boundary or buffer zone breaches would have adverse effect on the system and maintainence of the system
Livestock Rearing	It shows the inter dependency between the water system and the livestocks rearing in many ways such as source of water, maintainece of vegetation and ecosystem.

Closed Vents	Having knowledge or information on closed vents might add into further exploration of the line and reviving of the system.
Misfired Vents	Few wells behind AV18 deviates from actual line these wells can be called as misfired vents. It provides the opportunities for additional exploraton, study & research.
Highways	Highways are major pain points to the system as one highway runs above the line & another one is so close to the mother well. The reason highways being pain points are the load it adds on the system and vibrations which effects the systems. There might be chances of collapse.
Slopes/Natural Drain	Study of slopes/natural drain surrounding the system is very much important as these slopes carry runoff water & some times it will be path to streams of different orders. These are important as they recharge the system, maintains vegetation & can be source of water.
Construction	Construction of any type of infrastructure near to buffer zone, slope, streams or on karez line has its own effects like release of drain from settlements, destructions of water recharging systems & affecting load bearing capcaity on the systems.

Heritage	Heritage can be both vegetative(eg:-agave presence is very important as it opens the chances of study of topography & ecosystem of the region) and old houses, monuments conservation to explore tourism potential.
Topography	Study of topography where we map streams, slopes, soil types & forms helps in restoring & rejuvination of the system.
Location of the vent	Identify locations to indicate its boundaries, ownership, any disputes, and type of terrain.
Streams	Streams surrounding the naubad area are important for continous maintainance of ground water & these streams act as feeder to the wells.
Disputes & Ownerships	Knowing of ownerships like private or public or disputes helps in taking steps for planning & development

Overview of conditions in each air vent along the Karez

This view contains parts of the condition assessment along with the locations of the air vents.

Condition assessment of the Naubad Karez - Map 4

Pull to open

Vent 20 (Kanteppa Farm):Clear water. Land is used for farming. Lantana is present and the vent appears to be caved. The well size has been modified by the owner.

Vent 15 (adjacent to carpentry workshop): Water is not clear. There is both biological and physical contamination.Glass bottles and open defecation noticed.

Vent 12 (Naga Nirmal Function Hall): The vent is inside the hall and is fully covered. Water was used for the hall before, but has been stopped now.

Vent 8 (Gautham Budhha Nagar): Drainage path is near the vent. Parapet wall is covered with vegetation: visibility is low.

Gautham Buddh Nagar

Possible mother well

AV 21

Nearby Well

Possible Vent

AV 20

AV 19

Possible Vent

AV 18

AV 17

AV 16

AV 15

AV 14

AV 13

AV 12

AV 11

AV 10

AV 9

AV 8

AV 7

AV 6

AV 5

AV 4

AV 3

AV 2

Air Vent 1

Kund

Mouth of the Karez

Nirmiti kendra round Well

Naubad STP

Branch AV 3

Branch AV 2

Branch Air Vent 1

Vent 19 (Hay agge Farm): Clear water is observed in the vent. The land is used for farming and dairy.

Vent 13 (Behind func. hall): Open defection, garbage dump is seen around the vent, live stock rearing near to the vent. mapping of vegetation is needed as their presence of native & invasive species noticed.

Vent 7: Vent is maintained by community, but there is a buffer zone breach by settlements

Condition assessment of the Air Vents in May 2024

Indicators	Kunda & Temple	AV1*(AV - Air Vent)
Clarity of the water	Water near kunda and water discharging from kunda is highly clear but might have a biological contamination	Clean
Vegetation	Presence of lantena & identifying grass species is important for slope edges to arrest the soil erosion.	Presence of lantena & identifying grass species is important for slope edges to arrest the soil erosion
Land use	Land usage near temple and konda is for religious activities,ceremonies,marriages and the outflow is used for washing, bathing & livestock rearing and beyond konda the water is used for farming. There is major issue of garbage.	
Accessibility	There is no issue of accessibility near to temple & kunda	
Farming	Farmlands ten meters from kunda	
Collapse	Collapse of gallery near mouth of karez	Weakening of laterite stone lining is seen air vent
Livestock Rearing	Shepherd get their livestocks near kunda for drinking & rearing	
Construction	Near to the temple & kunda we see edge of the plateau, the slope cutting is done by temple management for parking	
Disputes & Ownerships	Boundaries - Aliyabad gram panchayat	Boundaries - Aliyabad gram panchayat
Heritage	Aliyabad siddeshwar temple, presence of three manhole in between mouth of karez & temple	
Topography	Presence of porous laterite slope near kunda, temple & mouth and there is stream behind the temple	Presence of laterite & slopy terrain
Usage of Water	Used by livestocks & near by settlements use it for washing clothes & bathing, pilgrims use water from kunda	
Location of the vent	Boundary of konda, temple and mouth of karez lies in naubad-forest area (D-category-4.12ac, Sy.no137)	Boundary of vent1 comes under naubad-forest (D-category-4.12ac, Sy.no137)
Streams	Stream behind the temple needs cleaning and tracking the route of the water discharghing from konda is important factor to asses usage of water	

Indicators	AV2(behind tea shop)	AV3(across the road)	AV4
Clarity of the water	Not Clean	Not clean	
Odour		odour from the vent due to pigeon droppings & due to presence of bats	
Vegetation	Presence of lantena & gulmohar which are invasive near to the vent	Presence of lantena, kadu tulsi & casia weeds which are invasive which effects grass cover	Presence of lantena, kadu tulsi & casia weeds which are invasive which effects grass cover
Land use	There is garbage dump from nearby hotels and household, presence of silt debris from previous cleaning which need to be cleared	There is garbage dump from nearby hotels and household, presence of silt debris from previous cleaning whuch need to be cleared	There is garbage dump from nearby hotels and household, presence of silt debris from previous cleaning whuch need to be cleared
Accessibility			Due to high vegetation cover & silt debris accessibility to the vent has become difficult
Encroachment			Housing layouts coming up adjacent to vent
Collapse	Weakening of laterite stone lining is seen near air vent		Weakening of laterite stone lining is seen near air vent & few laterite stones(used in stone lining) are lying near to vent
Breaches	There is breach in buffer zone as there is house and teashop	Buffer zone breach as there is construction of houses	Buffer zone breach as there is construction of houses
Location of the vent	Boudary of vent 2 comes under Naubad boundary -forest (D-category-4.12ac, Sy.no137)	The vent is located in the government land	The vent is located in the government land

Indicators	AV5 (90 degree vent)	AV6
Clarity of the water	Clean	Clean
Odour		Direct release of household drainage and natural drain(contaminated with drain) released into the vent
Vegetation	Heavy vegetation cover surrounding vent, the roots are penetrating the stone lining of vent, presence of thorny bushes and hebavu.	This vent is highly covered with invasive weeds like cassia, parthenium , kadu tulsi lantena & heavy tree cover. the grass cover has diminished.
Land use	There is garbage dump & glass bottles, premisis used for drinking & open defaction , huge silt debri near the vent which need to be cleared	Due to settlements house hold drain water is channeled toward vent, presence silt debri & the area is used for defecation, dumping of garbage (*girl child fallen near to opening of vent few months ago)
Accessibility	due to vegetation & silt debri accessibility becomes difficult	Accessibilty is difficult due to heavy vegetation cover & the vent is inside small pit.
Encroachment	Encroachment (govt buildings-anganwadi, sharan madar chanaya statue and probal sight for bhavan) & adjacent to vent housing layout coming up	
Collapse	Weakening of laterite stone lining is seen near air vent & few laterite stones(used in stone lining) are lying near to vent	Couldn't be seen due to difficult in visibility
Breaches	Buffer zone breach due to construction by govt and private entities	
Livestock Rearing		Shepherd get their livestocks for rearing due to heavy vegetation cover and presence of natural drain
Slopes/Natural Drain		Presence of natural drain/slopes which is the path of seasonal stream, which is now contaminated with drainage from the locality
Heritage	As we lookdown the vent we find 90° turn in the karez	
Topography		Terrain is slopy(path of natural stream/drain)
Location of the vent	The vent is located in the government land	The vent is located in the government land
Streams		Seasonal sream path is near to the vent

Indicators	AV7(Chunchur Mapur Temple)	AV8(Bhudha Nagar)	AV9(College Campus)
Clarity of the water	Clean	Clean	Clean
Land use	Vent is maintained properly	Path of drainage is near to the vent, might have chances of seepage into vent & the vent is being used by the households	In college campus near to vent there is a toilet(closed now)
Accessibility		Parapet wall covered with vegetation the visibility becomes difficult	College vent covered with concrete slab
Encroachment	Encroachment* check encroachment relevance	Encroachment* check encroachment relevance	
Breaches	Breach of buffer zone by settlements	Breach of buffer zone by settlements	
Construction	Concrete Cement road construction near vent	Settlements surrounding the vent	
Disputes & Ownerships			Property under dispute(trust property)
Usage of Water	Earlier water was used by the temple but now it has stoped (water is polluted with garbage and drainage, temple has recived a water connected from Jal Jeevan Mission)	Water is used from the vent by nearby houses	

Indicators	AV10 & 11(KSRTC Depot)	AV12(Naga Nirmal Function Hall)	AV13 & 14(Behind Function Hall)
Clarity of the water	N/A	Water is highly clear in the well but there is no penetration of light in the as it covered	N/A
Odour	N/A		N/A
Vegetation	Both the vents present in the depot are covered with grasses, shrubs & trees with some invasive species		
Land use	Area near the vents is used for dumping depot waste,tyres & trash. Near both vents we find earlier equipments used for cleaning(eg: crane,buckets) & silt debri near both vents need to be cleared	Area surrounding is fully functional convention hall, the vent secured with metal grill & covered with plywood	Open defection,garbage dump is seen around the vent, live stock rearing near to the vent, mapping of vegetation is needed as their presence of native & invasive species present
Accessibility	Both vents covered in vegetation, silt debris & openings are covered by tin sheds, accessibility becomes difficult		Difficult in accesibility as there is presence of heavy vegetation & seasonal stream flowing near to the vents & covered with silt debris
Encroachment		Encroachment* check encroachment relevance	
Breaches		Breach of buffer zone	
Highways	Start of highway near to vent, heavy vehicular movement	Start of highway near to vent, heavy vehicular movement	
Slopes/Natural Drain		A natural drain runs exactly behind the function hall, is now contaminated with local drainage water	Natural drain is flowing along both the vents but contaminated with the drainage
Construction	Toilet near to the vent	Stone lining is secured, covered with metal grill	Urgent need of protection walls as there is direct flow of drainage
Disputes & Ownerships	Govt ownership	Private ownership	Private ownership
Topography	Soft laterite patch		Hard laterite patch
Usage of Water		Earlier water used by convention hall people now it is stopped	
Location of the vent	KSRTC depot	Inside the function hall(Nag Nirmal hall)	Location near to malge farm & jabshetty layout(behind function hall)
Streams			Seasonal stream path near to the vents

Indicators	AV13 & 14(Behind Function Hall)	AV15(adjacent to carpenter workshop)	AV16(infront of school)
Clarity of the water	N/A	Water not clear both physical & biological contamination	Water not clear both physical & biological contamination
Vegetation			Surrounded by invasive weeds & grasses
Land use	Open defection,garbage dump is seen around the vent, live stock rearing near to the vent, mapping of vegetation is needed as their presence of native & invasive species present	Open defection & drinking(broken glass pieces), garbage dump.goat had fallen into the vent, livestock rearing & penning	Open defecation garbage dump huge stones used for stone lining found
Accessibility	Difficult in accesibility as there is presence of heavy vegetation & seasonal stream flowing near to the vents & covered with silt debris		
Collapse			Collapse of parpet wall
Livestock Rearing		Livestock penning during monsoon	Livestock rearing
Slopes/Natural Drain	Natural drain is flowing along both the vents but contaminated with the drainage		
Construction	Urgent need of protection walls as there is direct flow of drainage	Parpet wall constructed	Parpet wall constructed but collapsing
Disputes & Ownerships	Private ownership	Private ownership	Private ownership
Topography	Hard laterite patch	Hard laterite train	Soft laterite patch starts from here
Location of the vent	Location near to malge farm & jabshetty layout(behind function hall)	In the layout private (jabshetty layout)	In the layout private (jabshetty layout)
Streams	Seasonal stream path near to the vents		

Indicators	AV17(jabshetty layout)	AV18(Girish Farm)	AV19(Hay agge Farm)
Clarity of the water	Physical contamination into the vent	highly clear water in vent	highly clear water in vent
Vegetation	Covered with grass & less invasive species	Agave a native species is near to the vent	
Land use	No usage seen as such	The land is being used for farming, dairy & vermiculture	Surrounding land is used for farming, diary
Farming	Start of farmland near to the vent	Organic farming is practiced in the farm	Drift/leaching of farm chemicals
Collapse	Collapse of parpet wall		
Caving In		Caving in observed in vent	Caving in observed in vent
Breaches	Buffer zone breach	Buffer zone breach	
Closed Vents		Possible closed vents between Vent 18, 19, 20 & 21	
Misfired Vents			Behind this vent there are 3-4 misfired vents (deviates from original path)
Slopes/Natural Drain		Natural drain is very close to the vent	
Construction	parpet wall constructed but collapsing & construction of house, road near to vent	Grills around the vent	Parpet wall needed vent size modified from actual size
Disputes & Ownerships	Private ownership	Private ownership	Private ownership
Heritage		Presence of Agave a vegetation based heritage	100 yr old house a heritage near to the vent
Topography	Transitation from hard laterite to cultivable patch	Cultivable laterite	Cultivable laterite
Usage of Water		For farming & allied activity	Water used for farming & house hold usage, drinking etc
Location of the vent	near to the housing society	Girish farm	Hay agge farm
Streams		Stream running near to the vent	

Indicators	AV 20 (Hay agge Farm beside house)	AV21 (kanteppa farm)	AV22 (Mother well)
Clarity of the water	highly clear water in vent	highly clear water in vent	highly clear water in vent
Vegetation	Covered by trees	Neem tree planted near to the vent presence of lantena	Surrounded by mango, tamrind trees and lantena, kadu tulsi & grasses
Land use	Surrounding land is used for farming, diary	Land is used for farming	Land is used for farming
Farming	Drift/leaching of farm chemicals	Drift/leaching of farm chemical	No farming by the farmer-probable chances of land conversions from agriculture to non agriculture
Collapse			Cracks in laterite wall of the well
Caving In	Caving in observed in vent	Caving in observed in vent	Caving in observed in mother well
Breaches	Buffer zone breach		
Misfired Vents	Behind this vent there are 3-4 misfired vents (deviates from original path)		
Highways			Presence of highway near to the mother well
Construction	Parpet wall constructed	Protection wall needed, size of the vent modified by the farmland owner	Protection wall needed size of the vent modified by the farmland owner *round shape well
Disputes & Ownerships	Private ownership	Private ownership	Private ownership
Heritage	100 yr old house a heritage adjacent to the vent		
Topography	Cultivable laterite	Cultivable laterite	Cultivable laterite
Usage of Water	Water used for farming & house hold usage, drinking etc	Water used in farming	Water used in farming
Location of the vent	Hay agge farm	Kanteppa farm	Chonde farm

Impact

Impacts on Karez from urbanization

Changes in land use over the years have significantly impacted the buffer zone, leading to the shrinkage of the catchment area. The unregulated drilling of numerous bore wells, possibly around 100 in the vicinity of the Karez, has adversely and considerably affected groundwater levels.

Encroachments on water and ecological systems, including the tanks connected to the Karez, further exacerbate the problem.

Garbage and surface drainage water are major contaminants of the Karez gallery and groundwater.

Additionally, we have been informed that groundwater up to 500 meters beyond the source well has become contaminated, possibly due to the discharge of industrial waste from the Kolar industrial area directly into the aquifers.

This has to be investigated thoroughly during proper condition assessments as this would definitely affect the quality of water in the Karez. It also helps to ensure clean water for the people staying in the newly developed residential layout.

Impacts on Naubad Lake and Embankment

The embankment and reservoir area are under threat from from development activities, encroachments, and land conversion.

The mud embankment is being mined and levelled for land conversion, often without recognizing its historical significance as a model of sustainable water use. This rampant mining has exposed the wall constructed before the embankment, compromising its integrity. Additionally, a Gau-Shala (cattle shelter) has been built on the embankment in the past year.

Despite government guidelines, regulations, and Supreme Court judgments aimed at conserving water bodies, these have been blatantly violated in this case. Much of the surrounding land and the embankment itself have been encroached upon or are under private ownership. A now-closed brick kiln in the vicinity of the Naubad embankment was also mining soil from the reservoir area and the embankment. Although this activity has been curtailed, the kiln's location in the Naubad tank's catchment area has led to deforestation and the destruction of surface channels, which were natural streams that filled the tank during monsoons.

Rationale

The water discharged from the Karez is not being utilized as effectively as it should be. Currently, it flows through bushes and reaches a Y-junction, where it splits into trenches that farm owners have created to divert the water into their

fields. This process results in significant water wastage.

Historically, one arm of the Y-junction directed water towards a stream in the northeast, eventually reaching the now-invisible Aliabad lake. During the monsoon season, when the tank was full, this water would feed into additional streams through weirs, ultimately connecting to the Manjra River through streams at Markhal Village.

The other arm possibly carried water through underground channels, similar to those that transport water from the Mouth to the Siddeshwara Kund, towards the Baage-Hammam (ShikarGaah), a medieval palace located approximately 1.5 kilometers to the east.

Additionally, This report seeks to establish several areas of necessary study and intervention for forthcoming condition assessments:

1. What happens to the water being discharged?

2. What are better ways of utilizing the discharged water?

3. How do we sustain the system with the help of relevant stakeholders?

These questions aim to ensure the efficient use and long-term sustainability of the Karez water system. The report, hence, establishes a vision for water security of the region.

A Vision for Water Security

A vision to ensure water security for all,

Through the ways of building newer water infrastructure, restoration of historic water infrastructures and re-adoption of traditional practices of water harvesting/conservation/distribution/utilisation, adequate upkeep and maintenance of existing water structure/sources.

To create a model for water security, sustainability and resilience where water is valued, conservation and management is prioritised through collaborations between all stakeholders.

To safeguard the well-being of communities, environment/ecology and local economy.

By ensuring water equity, and prioritised engagement through community-led actions.

This report was created as a collaborative effort by Team YUVAA,
Living Labs Network & Forum and Aruvu Collaboratory