

# Integrated Rural Habitat Development Programme

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# 1 Executive Summary

Ecologically Sensitive Zones (ESZ) are the areas designated to protect the biodiversity and conservation of natural habitats for specific species. It aims to minimize the conflict between man and nature, and reduce forest depletion and ecological imbalances. Gir was declared as an ecologically sensitive zone by the Central Government in May 2016, after being a wildlife sanctuary for 51 years (September 1965).

There is a sudden increase in man – animal conflict events, which is damaging the wilderness & the local communities. Along with the man-animal banter, the increasing problem of climate change is affecting the eco-sensitive ensemble as well – increasing disasters pose a survival and livelihood threat to the aboriginals pressuring on the need for shelter and food. In addition, the development that has been taking place, which seemed like a ray of hope for the locals to have a better quality of life, is now affecting them – harm caused to environment, wildlife in terms of reduction in forest buffers, agricultural land transformed to resorts, hotels – contributing to carbon emissions.

To lessen the day-to-day Man animal banter and the larger impact on environment conservation and its upgradation, AKAH India took an initiative - a pilot project called Integrated Rural Habitat Development Programme - IRHDP. The interventions were initially done in 25 villages across Gir in phase I & with increased need to facilitate locals majorly along the border of the forest – due to adjacent forest – efforts were focused towards 15 villages in phase II. These interventions have helped sensitize the community for Climate change and its impacts, conservation measures – which overall has shown a positive impact towards environmental upgradation and biodiversity conservation. The report will further highlight about the issues & interventions so done to combat those issues.

## 2 Introduction

### 2.1 Background

Conservation of threatened species is less daunting within protected areas, where wildlife laws are easier to enforce compared to efforts required to safeguard dispersing wild animals ranging outside protected areas in human dominated landscapes (Woodroffe & Ginsberg, 1998). The largest compact tract of dry deciduous forests in the semi-arid western part of India – Gir; is the last abode of the big and regal predator, Asiatic lion (*Panthera leo persica*), an endangered animal species. Declared a sanctuary in 1965; successfully has saved this precious species from the brink of extinction. Out of the sanctuary's total size of 1153.42 sq.km, 258.71 sq miles were subsequently designated as a national park.

Gir Forests' topography is made up of a series of rugged ridges, isolated hills, plateaus, and valleys. Gir Forests also serve as a unique habitat for many mammals, reptiles, birds, and insect species, as well as a diverse range of flora.



Figure 1. Leopard, Indian spotted deer, rock python found in Gir  
Source: travel triangle

The omnipotent big cat draws people's attention away from the sanctuary's remarkable bird population, which includes the Malabar whistling thrush, Paradise flycatcher, crested serpent eagle, king vulture, and many more.



Figure 2. Indian paradise flycatcher, Malabar whistling thrush, Crested serpent eagle found in Gir  
Source: Wikipedia



Figure 3. Maldhari with his cattles  
 Source: Gujarat.net

Maldharis are the keepers of Gir, who have survived through the ages by having symbiotic relationship with the lion. Siddhis, on the other hand, live inside the core forest areas and are in interminable danger of wildlife attacks. Their day-to-day activities involves a major interaction with Forest Protected & buffer areas, which cannot be altered – grazing, food, shelter, livelihood generation.

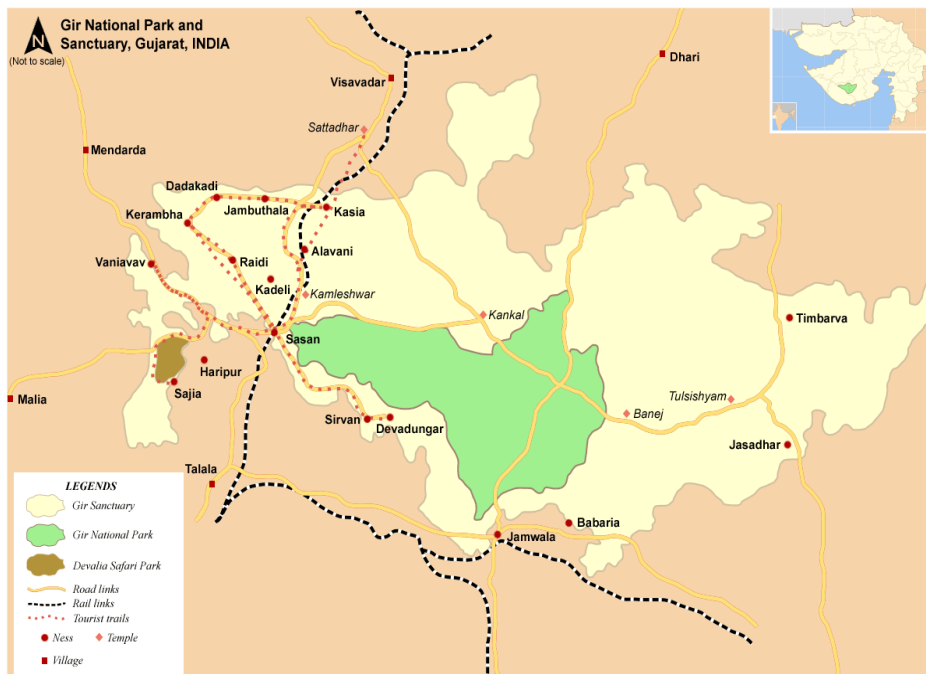


Figure 4. Sasan Gir map  
 Source: Wildlife Division

Based on AKAH India's core priority areas and the Government of India's high vulnerability to climate change impacts, the region has been chosen to carry out on-the-ground activities. Furthermore, the selection of the Gir Protected Area and surrounding region allows us to demonstrate implementation of ecosystem-based Community adaptation to climate change across a range of circumstances –

- i) biophysical vulnerability to climate impacts,
- ii) biodiversity loss, and
- iii) social vulnerability of target communities.

AKAH's goal is that people live in safe, sustainable, and resilient habitats. To achieve this goal, AKAH India collaborates with communities to help them prepare for and respond to conflicts and the effects of Man-animal conflict and Climate change.

## 2.2 Scope of work

The scope of work under this study includes:

- Development of Impact Assessment Framework for the Eco-sensitive area of Gir.
- Based on the Impact assessment, preparation of new adaptation strategies that could help in undertaking interventions for future risk reduction.
- Climate change adaptation using CSFEP
  - Establishment and strengthening of Bamboo value chain around Sassan Gir.
  - Bamboo as a construction material in houses.

## 3 Integrated Rural Habitat Development Programme

### 3.1 Project Need



*In past decades, cases of human-wildlife conflicts in India have rapidly increased, **resulting in the loss of human lives and wildlife too***

*Source: planet custodian*



*To the locals, wildlife takes on a darker shade of rosy, sometimes blood red. Various species of wild animals, from leopards to nilgai, damage their crops, eat their livestock while they try hard to make ends meet.*

*Source: Conservation India organization*

Figure 5. Man-animal banter



## As population of Gir lions grows, humans & cattle become targets

by Argus News

New Delhi | Sat, Sep 24 | 2:21 p.m.

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## Gujarat's Majestic Asiatic Lions Are Increasingly Migrating To the Beach; Habitat Depletion, Growing Population to Blame

By TWC India Edit Team · 20 July, 2022 · TWC India

### Gujarat: Child mauled to death in Gir forest, officials suspect by lion or leopard

Forest officials said that the child was attacked when he was walking in the area with his family members in the evening. The animal attacked him and dragged him away before the family could do anything to save him. Officials said that they have placed several cages in the area in the hope of catching that animal.

Abhijeet Christopher Loreng | Updated Oct 28, 2022 | 04:57 PM IST

### Leopard attacks bikers, no end in sight for man-animal conflict

The forest authorities have, however, denied such an attack and instead blamed "sudden scare leading to such a situation" due to the possible leopard movement in the area.

Published: 23rd September 2022 09:53 AM | Last Updated: 23rd September 2022 09:53 AM



Figure 6. Newspaper articles showing Man-animal banter

Human – Animal conflicts reported locally at Project villages/ Gir

The above shows how Man-animal banter is affecting both animal life as well as human life, making it clear and an imperative need to address the issue.

Rapid urbanization, industrialization and agriculture expansion cause a direct backlash on wildlife. With the increased development, **the forest cover has reduced, showing a loss of 33.43 sqkm of forest cover according to the 2021 FSI report.** Lions, leopards along with other predators and prey species, come directly into conflict with the human interests causing injuries and stress, due to disturbances inside & around Gir PA. Such situations manifold like injury to animals & humans - stuck in a village hutment, falling into parapet-less dug wells, injuring and/or killing people, damages to agriculture activities many more.

#### Other challenges & issues at Gir –

- Destruction of habitat due to grazing by domestic livestock of Maldharis and in-forest settlers.
- Increased traffic movement on roads passing through Protected & Buffer Areas.
- Changing land use pattern outside the Protected Area, especially changing grasslands to agricultural land.
- Increase in tourism related problems, development of infrastructure nearby the Protected Area.
- Ever growing human and livestock population in hamlets, forest settlement villages and peripheral villages.
- Increased GHG emissions due to setting up of new industries.
- Mining/quarrying in buffer and peripheral areas.
- Additional climate change impacts (as shown in annexure)

Along with the existing threat of Climate change, increment in anthropogenic activities also pose major harm to Biodiversity & Climate change. Climate change additionally increases the existing vulnerabilities – lack of natural resources for humans & animals. The following maps show the

vulnerable areas for Floods & Cyclones<sup>1</sup>.

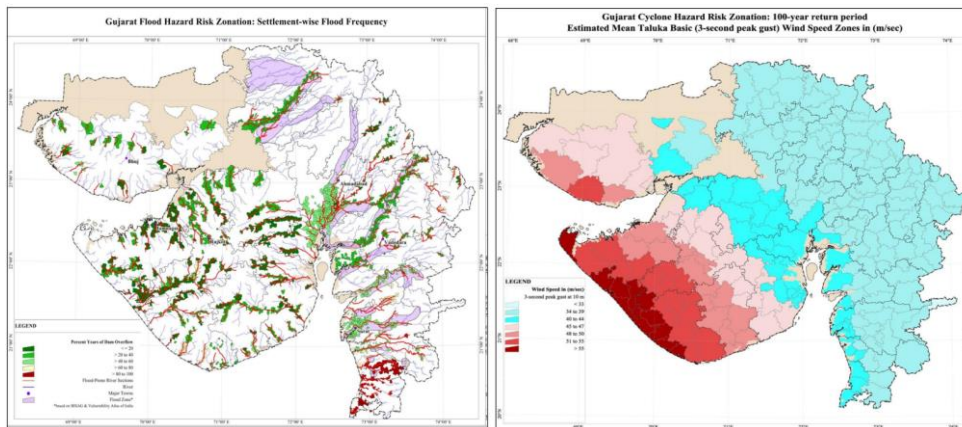


Figure 7. Flood and Cyclone map for Gujarat  
Source:GSDMP

More importantly, there is a significant increment in carbon emission levels that catalyze the Climate change effects in Microclimate of the region. The charts below indicate the amount of Carbon emissions from development (on-growing) sector; Gujarat, marking the highest contributor to carbon emissions in India<sup>2</sup>, while it was also the first state to sign in on Carbon crediting with the World bank. Between 2005 and 2013, the overall GHG emissions from the manufacturing-construction industry almost doubled from 315 million tonnes (MMT) to 623 MMT & **Gujarat produced 14%** of emissions as per SEEW analysis.

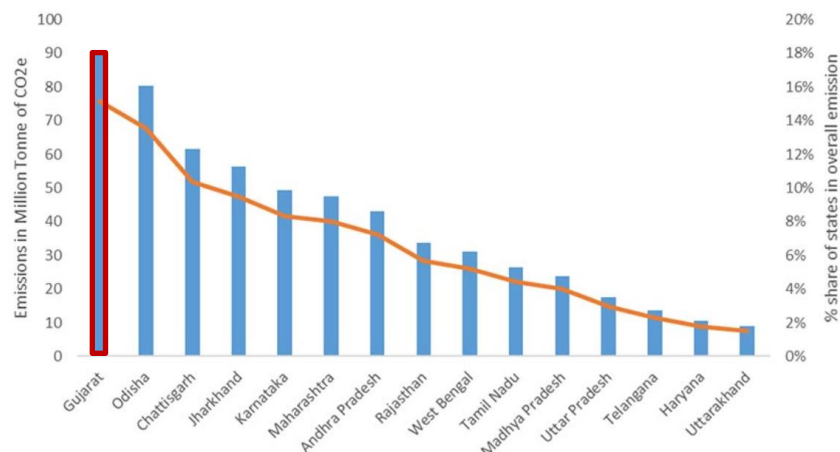


Figure 8. Emissions from top 15 Indian states for 2013  
Source: CEEW analysis 2017

In such a scenario, it becomes imperative to protect & conserve all the living beings, to balance the Gir ecosystem. The Gir ensemble, her unique natural beauty, the resources she offers, the tranquility; captivates tourist traction as well as commercial & business establishments.

In an aim to provide the best possible solution for construction activity and additionally, reduce the GHG emissions – AKAH India has initiated the pilot for CSFEP housing that uses locally available and refurbished materials, reducing the cement/ concrete and steel usage by using Bamboo as a structural member.

To support the CSFEP pilot, research is being done to enhance and strengthen the Bamboo value chain to promote bamboo as a cheap, fast growing and locally available construction material.

<sup>1</sup> 2016-17; Gujarat State disaster management plan, volume 1

<http://www.gsdma.org/uploads/Assets/other/gsdmp-2016-17-volume-106072017115412038.pdf>

<sup>2</sup> Sept 2017, Greenhouse Gases Emission Estimates from the Manufacturing Industries in India State Level Estimates: 2005 to 2013, V gupta et al, CEEW

<https://www.ceew.in/publications/greenhouse-gases-emission-estimates-manufacturing-industries-india-state-level>

## 3.2 Interventions

There was an underlying need to address Man-animal conflict and environmental degradation around Gir PA, which came into picture during the research study carried out for Disaster resilient Housing, by a group of architecture students from Massachusetts Institute of Technology, Canada. The research was taken further by AKAH India – devising a series of meetings and interactive sessions with the local community to outline the exact issues and conflict areas related to Man-animal conflict.

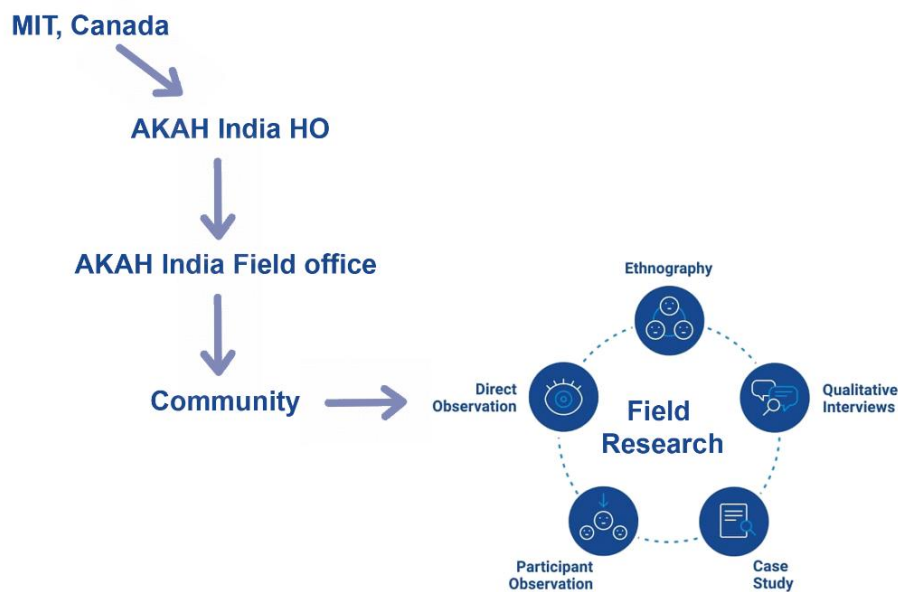


Figure 9. Methodology map for Interventions

source: author

Predominant human-wildlife conflict problems are predation on livestock, human injuries and death, crop damage and loss of property by wild animals. Depredation events on livestock by lion and leopard are quite common in and around Gir Protected Area as shown in table --. With constant conservation efforts by the Forest Department after declaration of Gir wildlife sanctuary (1965), the lion population increased from 117 (1968) to 700 (2022). The population of wild herbivores has also increased from 9635 (1973-74) to 1,55,659 (2019). Based on the field research carried out by AKAH India field team - interactions with the local community, panchayat, Forest department officials; the impact on Human life caused due to Man-animal banter was observed - economic, social, health related and other qualitative issues.

In such a fragile scenario, where both Human and wild life is being impacted and require relief, the best solution is peaceful co-existence as was in past (malधारis and siddhis of Gir). Additionally, nature-based solutions to prevent the man-animal conflict, along with community management – to skillfully sensitize the locals about the changing scenarios in terms of development and climate change, has brought about a positive impact to the problem.

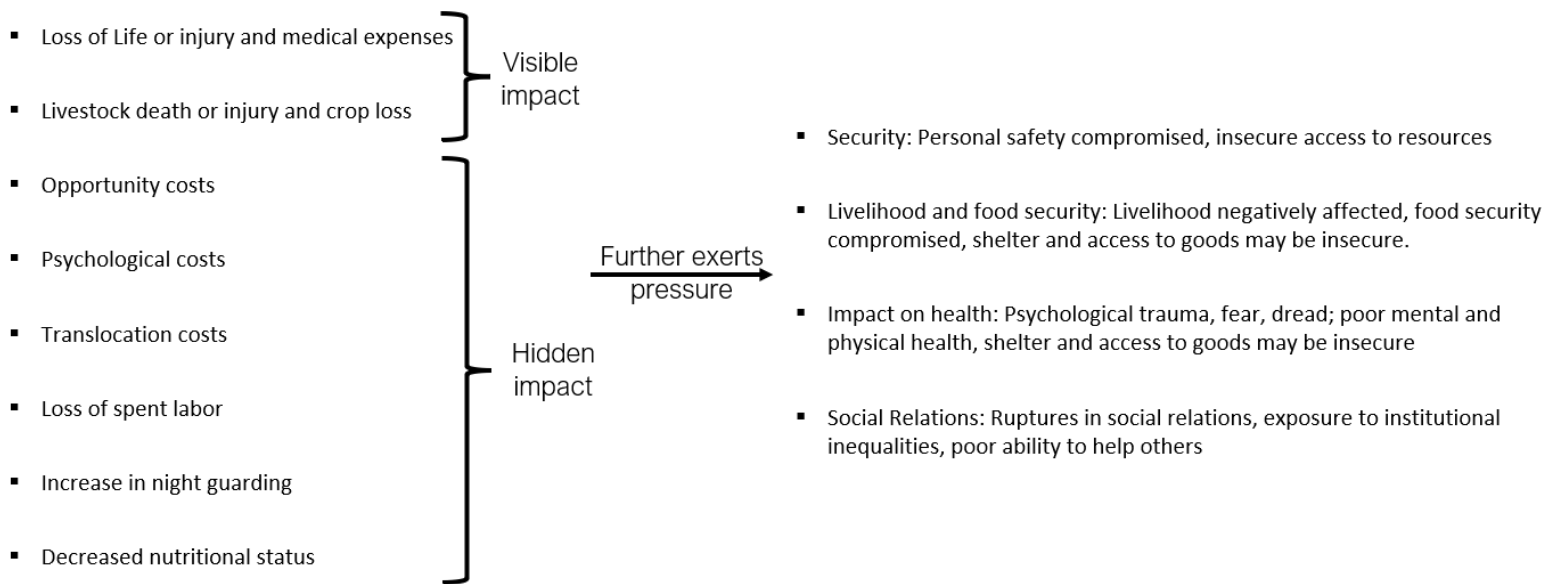


Figure 10. Impact indicators for community, *source: author*

AKAH India came up with Innovative participatory approaches & solutions with community's coordination, to reduce conflict prevailing in Gir.

- Farmland Fencing – to protect the crops against the wildlife that enters and damages the produce
- well cover – to prevent the animals from mistakenly falling inside the open dug well
- Machan – to facilitate farmers to look after their fields from an upper level, without the fear of animal attack on them
- Sanitation unit – to facilitate siddhi community of settlement village, Shirvan with basic facility of toilet and bathroom, preventing open defecation in jungle and therefore animal attacks on them
- Solar Street light – to facilitate locals after dark and preventing the animal attacks on humans and animals
- Rain water harvesting unit – to facilitate locals with water and preventing shortage of water
- Awareness activities on Biodiversity Conservation & Environmental upgradation – to establish a base for well-informed and educated locals about the prevailing issues related to biodiversity and climate change at Gir and solutions for the same

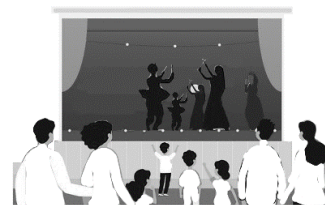
### Softskills' interventions



Focussed group discussion



Community awareness session



Drama session

Figure 11. Community engagement ways adopted by field team, *source: author*

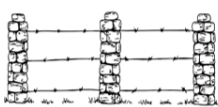





S.no	Intervention	Intervention picture	Number	People affected	Village/ Villages
1	Farmland Fencing		27	109	Moruka, Haripur, jashapur, Sangodra. Hiranvel, bhalchhel, Chitavad, Amrutvel, Shirvan, Chitrod, Amrapur
2	Well Cover		262	1014	Moruka, Haripur, jashapur, Sangodra. Hiranvel, bhalchhel, Chitavad, Chitrod
3	Machan		190	697	Moruka, Haripur, jashapur, Sangodra. Hiranvel, bhalchhel, Chitavad, Amrutvel, Shirvan, Chitrod
4	Sanitation unit		20	138	Shirvan
5	Solar street light		65	1052	Moruka, Haripur, jashapur, Sangodra. Hiranvel, bhalchhel, Chitavad, Amrutvel, Shirvan, Chitrod
6	Rain harvesting water unit (Borewell recharge)		02	120	Hiranwel and Katrasa

Table 1 shows the physical interventions undertaken in the project

*source: author*

Multiple awareness creation activities were planned & executed to evoke the sensitivity & need to live peacefully within the natural Gir environment, to balance the Gir ecosystem. Activities like Drama sessions, rallies, one on one discussions; were organized and facilitated by Gir Mitra (environmental ambassador) & village development community (VDC), selected, and formed by AKAHI as a part of mitigation strategy. The introduction of a Gir mitra further bolsters the motive of awareness creation as the local person is selected from within the village community, who can spend sufficient time with the community & village – to understand, acknowledge the challenges of living in/ around Gir PA & reciprocate & disseminate the learnings & findings about Biodiversity & Climate change to locals. This facilitates the community participatory processes thus ensuring the sustenance of the interventions.

## 4 Approach & Data

### 4.1 Methodology

#### **IRHDP Project –**

The focus here is to bring about a behavioral change in the local communities. To achieve this, series of physical meetings, group discussions, interactive activities; were organized to share the lived experiences of and from the local community with the following objectives –

- To sensitize the inhabitants about the fragile ensemble of Gir forest and neighboring areas.
- To strengthen the Man-animal bond in order to preserve the biodiversity and the local communities residing in the Gir PA and nearby villages.

The interaction so made, established a faith and value system between AKAH India & the community – which proved to be of greatest help during the problem identification process and stages so forth.

#### **Impact Assessment –**

The interventions were installed with an aim to reduce the prevailing Man – animal banter by bringing about a behavioral change within the local communities and to aware the community about the environmental health and effects that climate change has on it. The Impact assessment study was carried then with the following aims –

- To understand the impact the interventions have brought to reduce man-animal conflict
- To understand the worth of the proposed interventions – how essential they have proved to be - if they could be replicated in the future phases of the project
- To showcase the improvisation in community's behavior against Climate change, environment, and biodiversity

The study was done to understand the IMPACT that has been brought about after the interventions –

- ❖ Physical impact – betterment in health and social status
- ❖ Psychological impact – relation with wildlife, safety – fearlessness
- ❖ Financial impact – increment in income, crop produce increment, SROI chart

The study has been based on data collected from both secondary as well as primary sources. The major information based on the Gir locals' routine life, village profiles, forest profiles have been incurred using secondary sources. However, these sets of secondary information have been supplemented by primary data collected from:

- (i) a detailed survey of 378 stakeholders & 378 non-stakeholders across the project villages;
- (ii) meeting with key informants which included group discussions on the issues faced by locals as well as animals;
- (iii) a series of focus group meetings with various stakeholders viz; locals, Gir mitras, village development committees and functionaries of the forest department; and
- (iv) informal discussions with policy makers (local authorities, forest department).

## 4.2 Findings & Priority Assignments

There were certain indicators based on **physical, behavioral change and financial impact**, which served as basis to collect the data, to best showcase the impact achieved from the interventions.

### Physical impact indicators

- decrement in crop loss
- decrement in human deaths and injuries
- decrement in animal deaths and injuries

### Behavioral change indicators

- safety
- fear
- bond/ relation between human and animal

### Financial impact indicators

- increment in crop yield
- market produce increment
- savings on income (medical expense reduction)

An **SROI** (social return on investment) chart was aimed to be prepared to demonstrate the impact of the interventions. The chart could not be made as was envisioned due to unavailability of baseline information, lack of technical understanding of community and lack of skill during the impact survey data collection.

Based on the field inspection, interactive sessions, one – on – one meeting with the villagers, AKAHI field team cited certain issues that needed immediate addressing –

1. Man-Animal conflict -
  - a. Wildlife (leopard/ lion/ wild boar/ deer) risk their life while entering human settlements -
    - i. animals falling into open dug well
    - ii. being chased/injured/killed – while moving across village
    - iii. being chased/injured/killed – while entering the agricultural fields
  - b. Wildlife hampering human life while entering human habited areas – attacks/ injuries
  - c. Need for better infrastructural facilities – sanitation, waste management, street lighting

From the above findings, an immediate need to address to issues pertaining to Man-animal conflict –

- Dug wells to be covered
- Agricultural fields must be secured from wildlife entry
- Villages should have infrastructural facilities – livestock safety, human safety

## 5 Results - Impact Assessment

### 5.1 Impact Created

The interventions done by AKAHI for the betterment of Gir PA, to provide calmness & comfort to the humans as well as animals – so that they may co-exist peacefully, have benefitted both the targeted groups – locals & animals. The impacts of each of the interventions are shown below –

1. **Farmland Fencing** – Provision of 100 meters of fencing to protect humans and livestock from wildlife attacks and avoid crop damage.

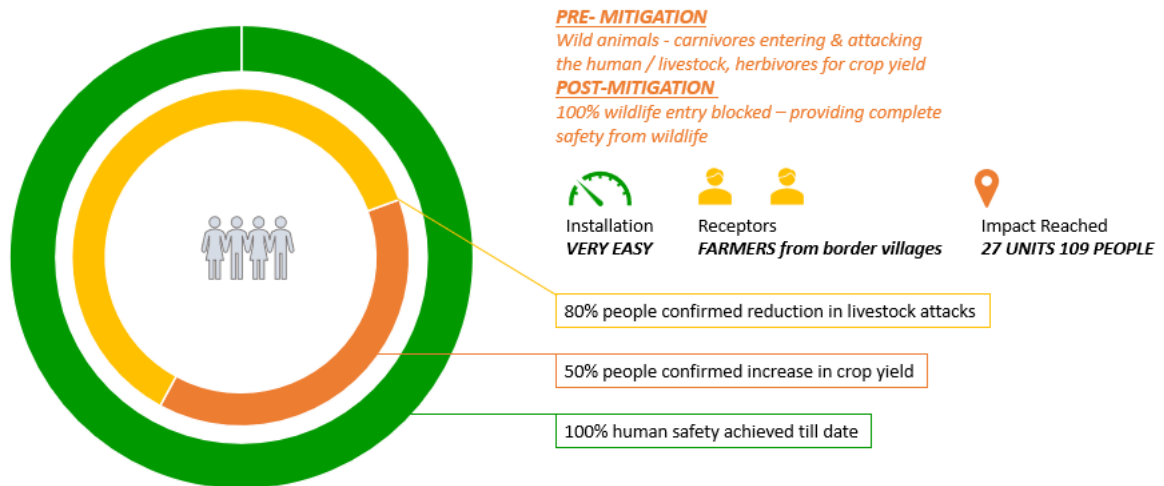


Figure 12. Farmland fencing Impact outcome

Source: author



Devabhai Hajabhai Bharada

Chitrad, Talala, Junagadh

*My land extends to 2.5 acres where I used to grow lentils, soyabean and various seasonal vegetables. Due to animal attack on fields, my yield would go waste, because wild animals would eat them in quite early stage of growth – which embedded me with huge losses and debt.*

*Recently, I got in touch with the organization – they helped me understand about Man-animal conflicts and ways to solve it. They provided me with 100mts of farmland fence and assisted in installation process. I used my savings to cover the remaining plot boundary, which now is fully covered and no wild animals can enter the field. Today, I have all my debts resolved and my land is animal free. Thanks to the team.*



2. **Machan** – Machan is an elevated platform that helps the farmer keep a watch on his/ her field providing a better angle and security from wildlife attacks. 190 such units were facilitated.

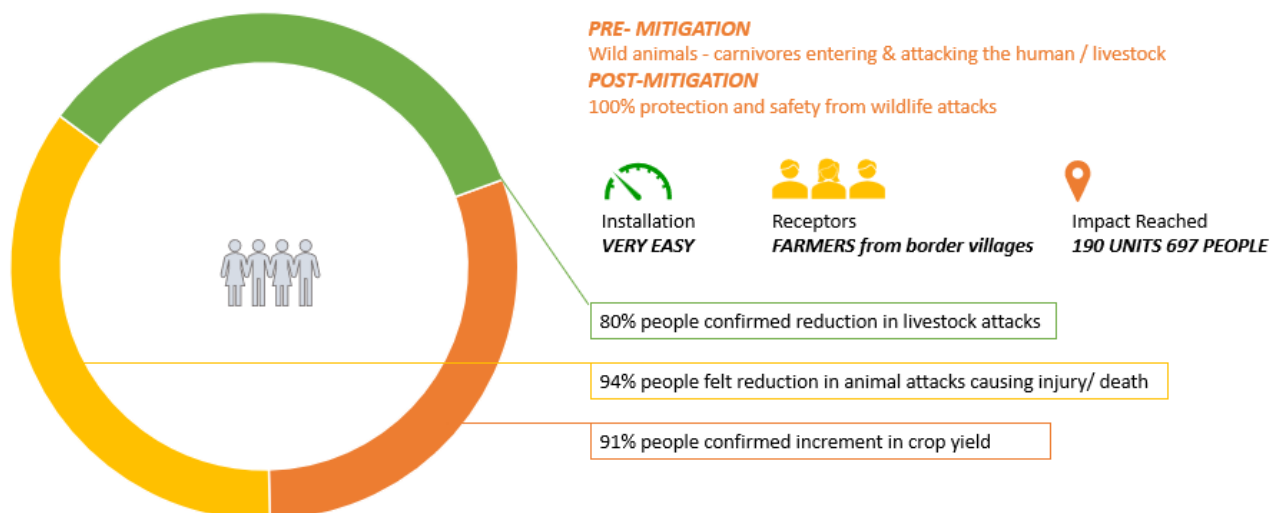


Figure 13. Machan Impact outcome

Source: author

Kankuben Rathod  
Kenedipur, Junagadh

*Our plot is just adjacent to the jungle, attracting many wild animals like leopard, lion, wild boar, blue-bull for food. Once, my son was on field guarding the crops when he observed a leopard coming his way into the field. He immediately climbed up the Machan and stayed there for entire night with leopard sitting just under the machan. We tried multiple times to distract the leopard and scare him away, but it did not work. After spending the entire night, the leopard left our farm and went into the jungle. My son that evening got saved because of this Machan. I motivate more farmers to get a machan at their fields. It saved my son's life and that is the biggest blessing for me.*

3. **Sanitation Unit** – There were 20 sanitation units constructed in Shirvan village (settlement village) in collaboration with the Forest department. Open defecation posed a threat of exposure to multiple viruses & germs causing various diseases, not to mention the lack of privacy and dignity faced by the locals daily.



Figure 14. Sanitation unit constructed on site, *Source: author*

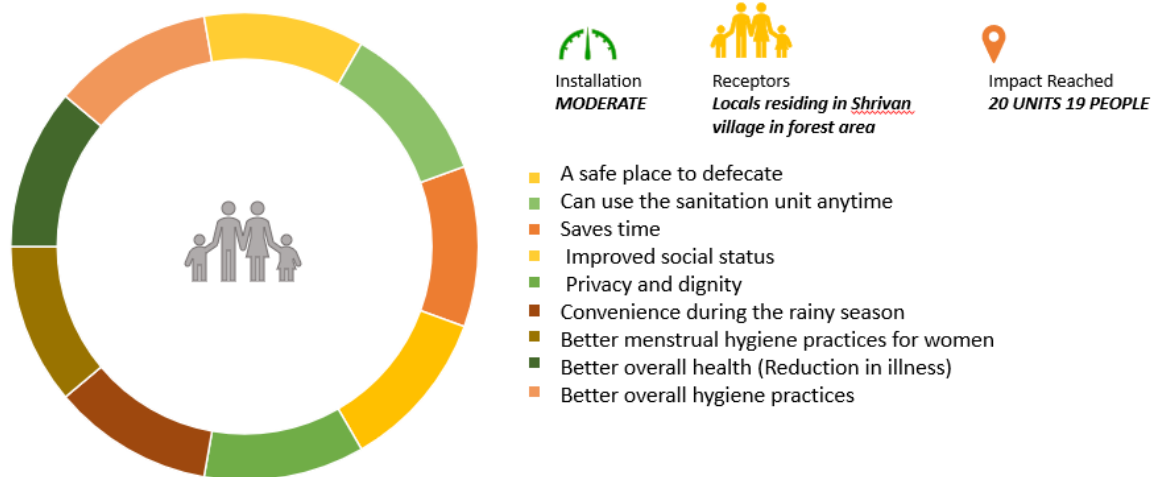


Figure 14. Sanitation unit Impact outcome, *Source: author*

4. **Solar Street light** – Installation of Solar Street light to protect Humans from Wildlife attacks in dark in the border settlement villages. Shirvan is one such example of a settlement village, where solar street lights were installed and community was highly benefitted.

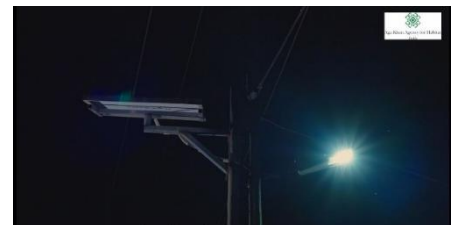


Figure 15. Solar street light on site, *source: author*

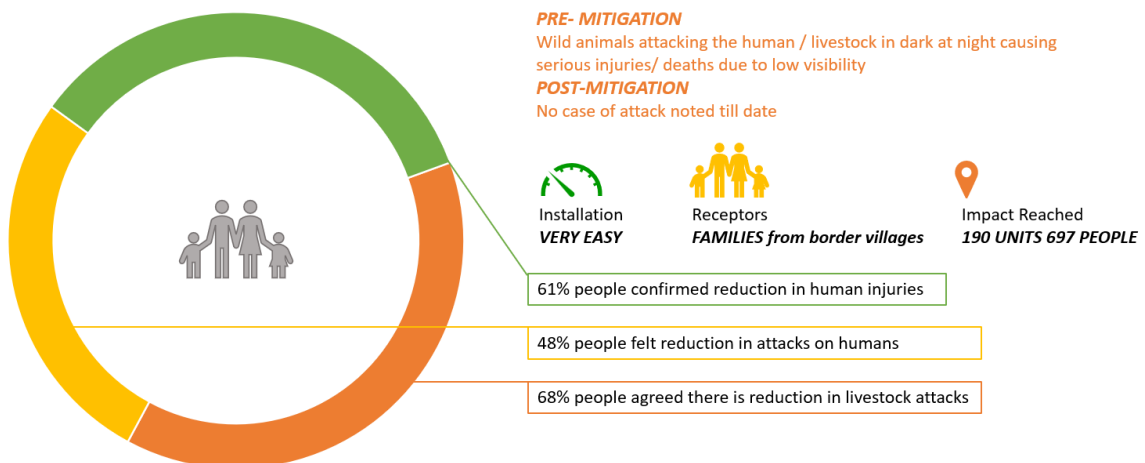


Figure 16. Solar street light Impact outcome, *source: author*

- Well Cover** - this was a much-needed intervention around Gir forest area, 165 well covers were put over the dug wells.



Figure 17. Well cover unit on site, source: author

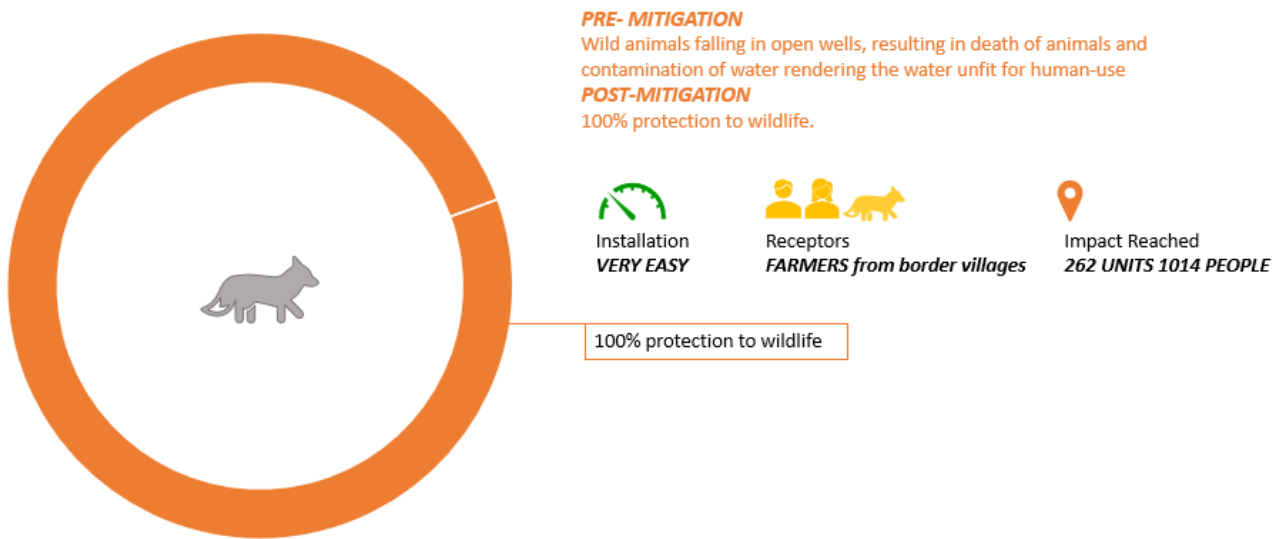


Figure 18. Well cover Impact outcome, source: author

The other interventions were awareness and education focused – creating positive impact on knowledge enhancement of locals through drama sessions, interactive group meetings, local rallies, one day celebration events for earth, water day. This hugely brought a change in the locals’ perspectives; they now have a much better understanding to effects of Climate change and are willing to contribute their part for the betterment of the region. The local government school was installed with a rain water harvesting kit to facilitate the school children and teachers and nearby residents.

Similarly, reduction in usage of plastic, tree plantation, water saving practices; such activities were adopted by the locals as their regular practice through a constant interaction between AKAH team and villagers. The local communities have developed a sensitivity & understanding towards on managing the biodiversity attacks without harming them, also a much-needed recognition of need to work on Climate change adaptation & mitigation strategies to protect the eco-sensitive Gir ensemble - through a **work system developed and managed by AKAH field team.**



Figure 19. AKAH’s adopted work system, *source: author*

The above hierarchy helped in smooth functioning of activities planned and enhanced the locals’ and AKAH team’s bond which led to the cooperation for achieving the larger objective.

**Financial data** – The provided fund was divided into the following bifurcations to achieve the desired target, along with beneficiary’s contribution.

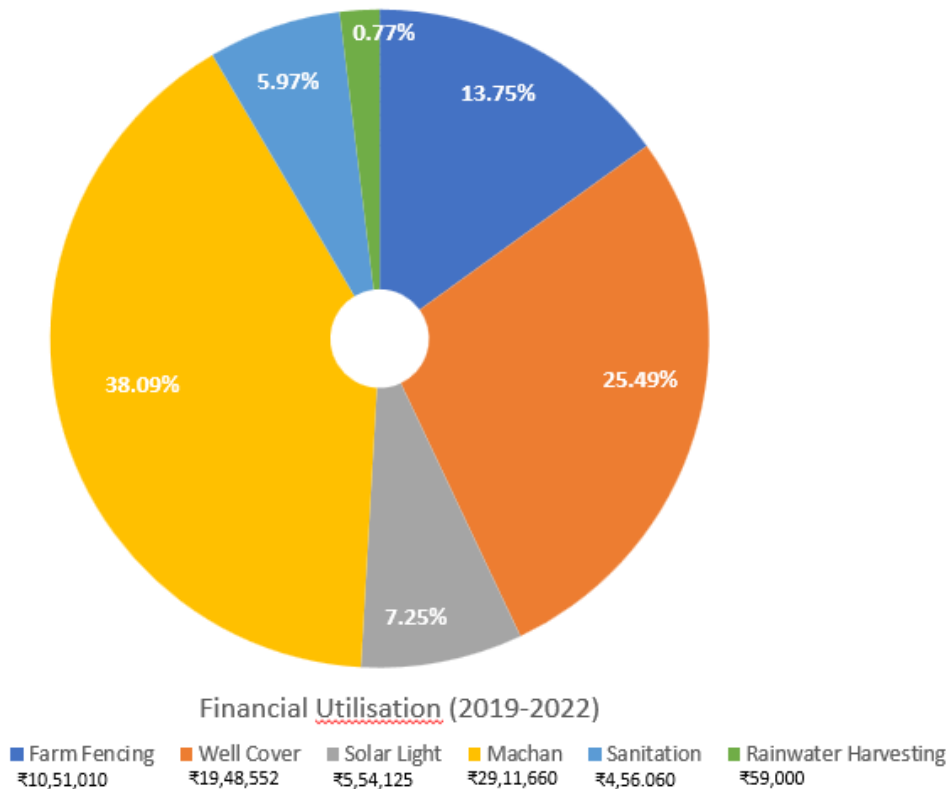


Figure 20. Funds utilization, *source: author*

## 6. Limitations

### 6.1 During groundwork

During Participatory rural appraisal –

- Forest department and villagers' association was not smooth – interrupted due to certain rules that would apply only to villagers, creating some friction
- Villagers were restricted to do interventions/ activities in their own fields from forest department adding to the existing rigidity
- Permissions and follow ups with forest department was a troublesome task – interventions were initiated without any written permission/ letters, based on verbal agreements
- Connections and bond with ground level officers played a crucial role, higher authorities showed least or no coordination and support whatsoever
- People who were not directly benefitted, created a minimal amount of pressure during work

### 6.2 During Interventions

- The intervention work in settlement villages and in villages adjacent to the forest border was troublesome as no written permissions were in hand
- People who were not directly benefitted, created certain amount of hindrance to the intervention process as they would influence the fellow villagers and beneficiaries against the objective which led to delay of intervention installations
- Permission related tasks got delayed as approvals took a lot of time and with no written proof for intervention, several other stakeholders stammered to proceed

### 6.3 During Impact assessment

The process of collecting data for recording impact after interventions was slightly cumbersome, due to the following reasons –

- The SROI chart could not be prepared because of unavailability of base information, recorded information, lack in community understanding.
- The locals were not fully aware of quantitative indicators such as productivity, medical expenses; making it difficult to show the positive impact.
- They did not have exact idea for expenses made – as the responsible person was not there at the time of impact survey
- The questions framed as part of Impact survey were slightly difficult to understand for them – due to unavailability of recorded data - animals falling into wells, people injured due to animal attacks, etc
- Certain training sessions to conduct an impact survey would have been helpful as surveyors were not very much aware of impact assessment – more briefing was required – for the respondents as well as surveyors - to get exact answers

- Since this was a pilot, the question made were not so apt – to have a quantitative answer for impact achieved
- The impact assessment was done on a short-term basis – interventions done are a long-term one and would need certain number of years to show impact
- The conflict has reduced from the interventions done, but the larger impact on climate, environment, biodiversity cannot be quantified in such short duration
- Due to unavailability of base data and surveyed data, SROI chart could not be framed as desired
- The interventions were initiated as per the need-based assessment; therefore, it was slightly difficult to have a larger impact – also for measuring
- There were places where there were not much issues or events of conflicts in last few years, but interventions were made to avoid future conflict events (recording impact was not possible)

## 7. Way Forward

As shown above, the interventions – Farmland fencing, Sanitation units, Machan, Well cover, Solar street light; were needed in the respective villages. The stories as told by the beneficiaries further demonstrate the positive impact these interventions. However, there are only a limited amount of hardware interventions that were done, and as expansive the Gir eco-sensitive ensemble is, it requires more such interventions to facilitate the local community as well as the wildlife. There is also need of other interventions that requires to address the ever increasing & deteriorating challenge of climate change, the carbon emissions through various activities happening around the region.

### 7.1 CSFEP

The breakthrough initiative being implemented by AKAH India titled “**Climate Smart Timber Housing for Low-Income Communities in Gujarat, India,**” under Climate Smart Forest Economy Program aims to redesign housing opportunities, shifting to use of timber from local community-managed forests to benefit both the forest and housing communities, while creating climate and economic value. AKAH India’s climate-resilient community housing will be transformed to use locally sourced mass timber, unlocking a nascent industry, and stimulating economies through forest restoration. The key objectives of the program are –

- **Piloting hybrid timber home construction** for decarbonization with removal of ban in India on use of timber in construction and reducing use of carbon intensive materials.
- **Demonstrating sustainable community management of forests, and agroforestry through community participation** through integration of research in the afforestation program of AKAH India in the region.
- **Knowledge Sharing on Climate Change Mitigation** through the breakthrough initiative with demonstration of climate smart timber homes and sustainable forest management.

The aim of the program is to reduce the excessive Carbon emissions that are released in atmosphere due to construction and related activities in & around Gir region. Gir, being a well renowned place having a major

tourist traction, could adopt such construction practices that benefit the environment – by not releasing carbon; as well as serve the purpose of tourist facilitation.

## 7.2 Bamboo Value chain

Bamboo has been widely known as a sustainable building material, it can be easily cultivated and harvested in a relative short time and can be reused. Bamboo as building materials is easy to bend and lithe. These characteristics are very suitable for building construction. The use of bamboo as building materials has occurred in a long period. Most of traditional houses in Tropical countries – Indonesia, Japan, Singapore) use bamboo as building materials, both as structural and non-structural materials. The use of bamboo in traditional houses is due to the large availability of bamboo.

Post Industrialization, there was introduction of newer construction materials – cement, steel, glass; which took over, leading to decline in usage of Bamboo. Lately, with the alarming & adverse impacts of Climate change, more attention is drawn to introduce materials that emit less carbon – bamboo being one such material.



The image shows an example of a house prepared completely using Bamboo, which is functional, adds to the carbon reduction process and is aspirational as well. **Bamboo value chain study** will provide more accessibility and better understanding for Bamboo procurement for various construction and related activities in Sassan Gir, Gujarat. The study shall be guiding the ways for Bamboo plantation, establishing the links where bamboo is commercially used to maintain the value chain, mainstreaming bamboo as a construction material – local and

easy availability & at a suitable cost. In addition to this, establishment of a bamboo value chain within Sassan Gir - Gir Somnath is proposed to facilitate the rural community by providing them with climate resilient housing which would be disaster (earthquake, flood, and cyclone) prone along with producing lesser carbon. This would also provide an employment opportunity to the locals in the form of bamboo cultivators, harvesters, bamboo treatment providers, processors, suppliers, and masons as well. This is aimed to serve and elevate the status rural women by providing them with work opportunities in above mentioned sectors of value chain.



A demonstration of Bamboo porch constructed by AKAH field team with CGBMT's support at Habitat resource center Chitradav

## Annexures

Table 1

<b>26/01/2001</b>	Earthquake Mw 7.9	Kutch - Over 13000 people killed. A total of about 1.3 million houses, lifeline infrastructures were damaged to variable extent. <i>(Source: IRIS/NEIC/TARU/GSI)</i>
<b>2001-2002</b>	Drought	40% damage of crops sown after the first rains due to delayed and scanty rains. <i>(Source: Relief Web)</i>
<b>July 2005</b>	Flood	About 125 people died <i>(Source: Indian Red Cross Gujarat state branch)</i>
<b>July-August 2006</b>	Flood	Surat city and south and central Gujarat - Nearly 150 people had died in the floods while over 100 others had died in post-flood epidemic of leptospirosis. Direct and indirect monetary losses has been estimated at Rs 16,000 crore, of which Rs 9,500-cr was in form of direct damages and Rs 6,500 crore in form of lost production. <i>(Source: WSEAS-Issue 2 – Vol. 3)</i>
<b>2009</b>	Hepatitis B Outbreak	Sabarkantha district- 456 cases and 89 deaths
<b>2012-2013</b>	Drought	Severe deficiency of rainfall in Gujarat during the Monsoon-2012. As on 02.08.2012, Saurashtra & Kutch Regions of Gujarat had -79% departure from Long Period Averages (LPAs) while Gujarat region had -55% departure from LPA. All the districts of the State were deficient in rainfall, ranging from -24% to -91%. Drought was declared in 132 Talukas of 17 Districts of the State. (Drought Memorandum - Revenue Department)
<b>5<sup>th</sup> January, 2013</b>	Fire	A major fire broke out with an explosion at IOC – Hazira on 05/01/2013 at about 12:41 hours in the tank having 5004 KL petrol; 5 workers lost their lives. 71 Nos. of fire tenders from different Municipal Corporations, Municipalities and Industries were applied for fire fighting and transportation of water. The fire completely doused at 11.30 am on 07/02/1013 and all-clear message has been given to concerned authorities (CFO-Surat report).
<b>2013-14</b>	Flood	In the month of August, due to heavy rainfall in the catchment area of Narmada river and release of water from Narmada Dam, Bharuch, Narmada and some part of Vadodara districts got affected. During rescue operation in Bharuch, Narmada and Vadodara districts about 8159 persons and 3588 cattles were evacuated. The State experienced extremely heavy rainfall from 21 <sup>st</sup> to 28 <sup>th</sup> September 2013, almost in all the districts. 14 districts that received unprecedented rainfall during this period and were worst affected include Surat, Vadodara, Bharuch, Navsari, Narmada, Rajkot, Junagadh,

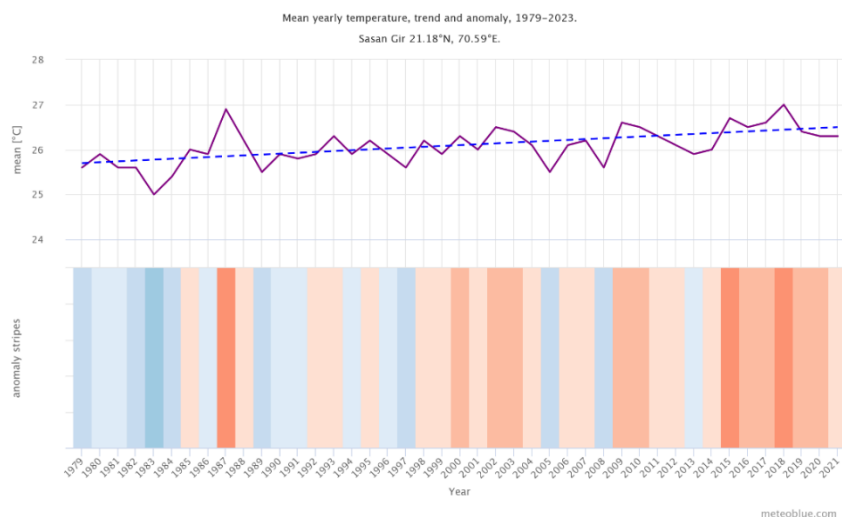


		Porbandar, Jamnagar, Kutch, Patan, Banaskantha, Sabarkantha and Mehsana. The rains impacted more than 50% of the geographical area of the state. More than 1500 villages were severely affected. 27 persons lost their lives. Infrastructure including power, water supply and roads were badly hit. Agriculture and cultivation were also severely affected. Over 2.23 lakh persons were evacuated by administrative efforts and were shifted to safer locations.
<b>Oct 2014</b>	Cyclone	Nilofar- Rapidly weakened into cyclonic storm before the landfall
<b>2015</b>	Swine Flu	6593 cases and 439 deaths (till March 2015)
<b>June 2015</b>	Flood	70 human deaths; 443563 persons affected; loss of thousands of cattle & wild animals; destruction in 390 villages. Affected districts include Amreli, Bharuch, Bhavnagar, Gir Somnath, Jamnagar, Junagadh, Porbandar, Rajkot, Surat, Valsad.
<b>July 2015</b>	Flood	86 human deaths and 89373 animal's deaths. Worst affected districts include Banaskantha, Patan, Kutch and Mehsana
<b>2016</b>	Drought	1115 villages of 6 Districts (Banaskantha, Dwarka, Kutch, Jamnagar, Porbandar and Rajkot) declared drought affected

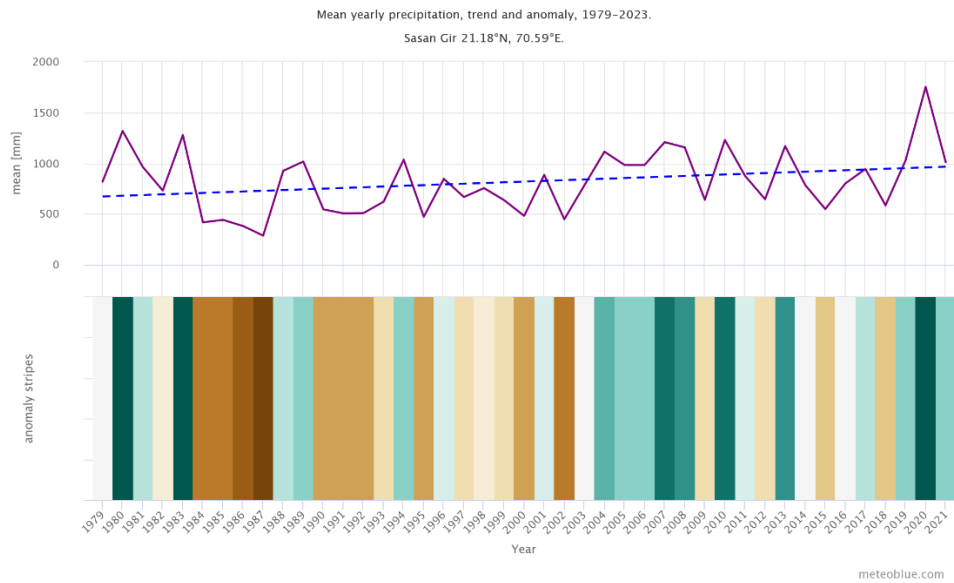
The above course of events has happened because of increase in temperature & erratic precipitation which are an outcome of Climate change. Over the period, the maximum temperatures at Gir have seen increment shown in the graphs below.

Graph 1 shows the that after 1997, the mean temperature has kept on increasing & as the liner climate change trend is rising – Gir is getting warmer as also justified by the warming stripes in shades of red.

Graph 2 indicates the conditions are becoming irregular in Gir over time, as the linear climate change trend line is going up (from left to right). The precipitation stripes indicate the increment in wetter years with some dry years in between showing the erratic nature of precipitation with the increase in temperature after 2004.



Graph 1 – an estimate of the mean annual temperature for the larger region of Gir  
linear climate change trend  
colder year  
warmer year



Graph 2 – estimate of mean total precipitation for the larger region of Gir  
 linear climate change trend  
 wetter year  
 drier year

Source: meteoblue

List of Animal/ Human loss events - Source-author (Harsukh S.)

Date	Source	Location - Village	Animal attacking/ affected	Incident	Remarks
7/1/23	Gujarat Samachar newspaper	Khambha, Amreli	Lion & Lioness	Fell in to open dug well	Both Died inside dug well
6/1/23	Gujarat Samachar newspaper	Manpur, Junagadh	Lion	Came inside village	3 cows killed
1/1/23	Gujarat Samachar newspaper	Mangnath Junagadh	Leopard	Attack on human	1 young man injured
30/12/22	Gujarat Samachar newspaper	Talala, Ankolwadi; Gir Somnath	Leopard	Came inside village	Caught by Forest department
28/12/22	Gujarat Samachar newspaper	Shergadh, Junagadh	Leopard	Fell in open dug well	Died inside dug well
28/12/22	Gujarat Samachar newspaper	Ganetha, Sutrapada; Gir Somnath	Leopard	Came inside village	5 domestic animals killed in 15 days by leopard
28/7/22	Gujarat Samachar newspaper	Bantwa, Junagadh	Leopard	Fell in open dug well	Rescued by forest department
25/7/22	Gujarat Samachar newspaper	Nageshree, Amreli	Leopard	Attack on human	1 old lady injured and one young man injured
24/7/22	Gujarat Samachar newspaper	Dhari, Amreli	Lion-Lioness	Attack on human	1 young farmer killed
17/7/22	Gujarat Samachar newspaper	Veraval, Gir Somnath	Leopard	Attack on human	1 man injured
9/6/22	Gujarat Samachar newspaper	Bhesan, Junagadh	Leopard	Attack on human	1 farmer injured
9/6/22	Gujarat Samachar newspaper	Gir Gadhada, Gir Somnath	Lion	Attack on human	1 man injured
2/6/22	Gujarat Samachar newspaper	Kankai, Gir Somnath	Leopard	Attack on human	1 child injured
1/6/22	Gujarat Samachar newspaper	Maliya, Junagadh	Leopard	Attack on human	1 child injured
31/5/22	Gujarat Samachar newspaper	Veraval, Gir Somnath	Leopard	Fell in open dug well	Rescued by forest department

