UNIKASSEL VERSITÄT

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

Excursion Reader: Rural-Urban Transitions in Indian Agriculture & Forestry

7TH INTERDISCIPLINARY STUDY TOUR- INDIA 2019
01.03.2019 – 22.03.2019

Faculty of Organic Agricultural Sciences – University of Kassel
Faculties of Agricultural Sciences and Forest Sciences – University of Göttingen
DITSL Witzenhausen

Report

Organised by:

Organic Plant Production & Agroecosystems Research in the Tropics & Subtropics

University of Kassel / Witzenhausen

Animal Husbandry in the Tropics & Subtropics - Universities Kassel and Göttingen

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Rural-Urban Center at the University of Agricultural Sciences, Bangalore

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All pictures in this reader are taken by excursion participants unless stated otherwise.

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Preface

The University of Kassel in Witzenhausen and the University of Göttingen offer study programmes in the fields of agriculture, forestry, environmental and natural resource management, food, nutrition and related sciences in the context of rural development, sustainable resource use and poverty alleviation with a regional focus on developing countries particularly in the tropics and subtropics.

Both universities build on a wealth of expertise in studying tropical land use systems and fostering sustainable management of natural resources. Many of the students interested herein will eventually conduct research in subtropical and tropical countries – often in the frame of their MSc or PhD theses. Their academic curriculum must prepare them for this task. It is obvious that even the best lecture at the university in a so-called "developed" and temperate region cannot substitute the experience that is gained while visiting a tropical country. Therefore, student excursions to tropical countries are a most desirable part of any such curriculum.

Scientists of the agricultural faculties of both universities maintain mutual research and academic training and networking activities with the University of Agricultural Sciences Bangalore in India, particularly in the framework of the DFG-funded Research Unit FOR2432 "Social-Ecological Systems in the Indian Rural-Urban Interface: Functions, Scales, and Dynamics of Transition". The 2019 study excursion entitled *"Rural-Urban Transitions in Indian Agriculture and Forestry"* of students and lecturers from Göttingen and Witzenhausen has benefitted from these institutional as well as personal linkages.

From an agricultural and forestry perspective, India is an ideal country for a scientific excursion focusing on (regionally and globally) increasing urbanization and its impact on society as well as on land use patterns and intensities. The country spans a multitude of tropical, subtropical and montane agroecological zones, which allow studying the influence of abiotic and biotic factors on social transformation processes. The high diversity of the agricultural and forestry sector, with its wide range of different forms and intensities of production, makes it possible to demonstrate and discuss alternative development pathways within this sector and the associated advantages and disadvantages. As India's raw materials and food-producing and manufacturing sector is currently changing dramatically under the influence of rapidly rising demand in the country (especially from more affluent urban strata) and increasing (political) influence of urban consumers, this multi-faceted country was the ideal study case for our excursion on the subject of Rural-Urban Transitions in Agriculture and Forestry.

The excursion was preceded by preparatory seminar of two contact hours per week in winter semester 2018/19, where students presented different topics related to the forth-coming excursion.

Acquiring funds for such a trip is difficult and
we are grateful for generous financial support by

Universities of Kassel and Göttingen, through their various funding programmes

Faculty of Organic Agricultural Sciences at Kassel University

Faculties of Agricultural Sciences and of Forest Sciences and Forest Ecology at Göttingen University

Universitätsbund Göttingen e.V.

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Hochschulverband Witzenhausen e.V.

German Institute for Tropical and Subtropical Agriculture – DITSL GmbH Witzenhausen

The study tour from March 1st to March 22nd 2019 was organized in cooperation with the **Rural-Urban Center (RUC) at the University of Agricultural Sciences Bangalore (UASB),** in particular by **Dr. Prem José Vazhacharickal,** to whom we herewith express our sincere gratitude. We also sincerely thank our further partners at UASB, ICRISAT Hyderabad, TATA Institute of Social Sciences Mumbai, Lokhit Pashu-Palak Sansthan in Rajasthan and many more hosts at each of the visited locations.

In a group of 26 students, 2 guests and 4 faculty members, we followed through a very interesting and physically taxing programme. Every aspect of the excursion enrolled exceptionally smooth, thanks to the excellent support provided by our hosts and the strong motivation of all participants. Thus, also the **participating students** deserve a big "Thank You"! They worked hard to achieve the predetermined goals of this excursion, and besides dealing with hard-core scientific matters, we also had a very pleasant time together.

We really enjoyed this exciting trip with all of you!

Andreas Bürkert
Achim Dohrenbusch
Renuka Suddapuli Hewage
Birgit Felmeden

and, from backstage
Eva Schlecht
Christian Hülsebusch

Interdisciplinary Study Tour March 2019

"Rural-Urban Transitions in Indian Agriculture and Forestry"

Programme

Date	Day	Activity	Indian contact	Transport	Hotel
1/03/2019	Friday	15:45h-07:40h (+1) FRA-COK (AirIndia) // 10:05h-07:15h (+1) FRA-COK (OmanAir)		Airplane	Airplane
2/03/2019	Saturday	Arrival 07:15 (OmanAir/AirIndia)/ 07:40h Kochi // Afternoon: Ship travel through harbour, Old Jewish City, Church St. Francis		Taxi	Treebo Heaven Gardens
3/03/2019	Sunday	Kochi: Coconut farming systems + Organic pepper // Organic and Biodynamic plantation // Travel to Periyar National Park	Prem Vazhacharickal / Jose Kallarackal	Bus	HotelKumily
4/03/2019	Monday	Periyar National Park (Elephants+Tigers)	Prem Vazhacharickal / Jose Kallarackal	Bus	
5/03/2019	Tuesday	National Park to Kochi // 20:30h-21:35h IndiGo: COK-BLR	Prem Vazhacharickal	Flight / Bus / Taxi	UASB-Guesthouse
6/03/2019	Wednesday	Bangalore city (UASB experiments + milking animals)		Uber / Ola	
7/03/2019	Thursday	Bangalore rural: Farming systems	Sunil Nautiyal / Umesh / Ganeshaiah	Rikscha	
8/03/2019	Friday	Morning flight: 08:15-09:15h AirIndia BLR-HYD // Visit of ICRISAT	A. Whitbread	Flight	FabHotel Mansingh
9/03/2019	Saturday	Hyderabad: Muslim Old City + Qutb Shahi tombs // 22:00h Train departure to Mumbai		Sleeper train	Train
10/03/2019	Sunday	11:00h Arrival Mumbai by train // City visit on your own: Gate of India		Uber / Ola	Guest Inn Hospitality
11/03/2019	Monday	Mumbai ICDD TISS / Dharavi Slum		Rikscha	
12/03/2019	Tuesday	Mumbai-Urban Agriculture	Nandita Mondal - TISS Mumbai	Rikscha	
13/03/2019	Wednesday	12:45h-0:56h (+1) Budget Train: Mumbai-Falna *(tickets under procurement)*		Train	LPPS
14/03/2019	Thursday	LPPS: Raika camel and goat keeping	Ilse Köhler-Rollefson	Minibus	
15/03/2019	Friday	LPPS: Raika camel and goat keeping	Ilse Köhler-Rollefson	Minibus	
16/03/2019	Saturday	8:00h Aravalli Range - Kumbhalgarh Fort - Ranakpur (Jain Temple) - Jaipur		Minibus	FabHotel Royal CM Bani Park
17/03/2019	Sunday	Jaipur: Amber-Fort / Working elephants / Wind tower / Social enterprise @ Mogul city)	Ali (Rikscha driver)	Rikscha	
18/03/2019	Monday	08:05h-11:00h Spice Jet: Jaipur-Guwahati (JAI-GAU) // Bus trip with Debdulal		Taxi / Flight	River Breeze/View Guest House Guwahati
19/03/2019	Tuesday	Assam: Tea plantations (labour conditions pick/ factory) + Agroforestry		Minibus	Aranya Tourist Lodge in Kaziranga
20/03/2019	Wednesday	Assam: 04:30h-10:00h Kaziranga National Park on elephant // Return to Guwahati	Debdulal Saha - TISS Guwahati	Minibus	River Breeze/View Guest House Guwahati
21/03/2019	Thursday	07:00h-13:00h Exams // 19:20h-7:35h (+1) Guwahati-Delhi-Frankfurt (GAU-DEL-FRA)	TISS		Airplane
22/03/2019	Friday	07:35h Arrival Frankfurt (AirIndia)	TISS		

Seminar Handouts

SOCIAL-ECOLOGICAL SYSTEMS AND RURAL-URBAN TRANSFORMATION: THE BASIC THEORY

by Kira Fastner & Henri Tepasse

Social-Ecological Systems: Definition

They consist of an ecological system, which is intricately linked and affected by one or more social systems. Such adaptive systems are composed of two primary subdomains (human society & economy and ecology) and are interdependent in effecting joint outcomes. Both subdomains change their state in response to another. In this manner, social-ecological systems exhibit a strong co-evolution as they develop over time.

Social-Ecological Systems: Framework

SESs are multidimensional and highly complex. A framework is useful in providing a common set of potentially relevant subcomponents and their variables. Four first-level core-subsystems can be identified in a SES: 1) Resource systems, 2) Resource units, 3) Users, 4) Governance system. Analysing the relationships between and within the core subsystems as well as deeper-level variables enables the understanding of its complexity and relation. Frameworks help to identify factors that grasp relevant variables for studying the complexity of SESs as a whole.

Social-Ecological Systems: Theory and challenges

The theory and science focus on the two main subsystems with their deeper-level variables and how their interactions can be better analysed in a holistic view. Establishing comparative databases shall increase the knowledge to enhance the sustainability and resilience of SESs. The establishment of comparative databases helps to identify more relevant variables to understand their complexity and interdependencies. One scientific approach is to value ecosystem services to make the society more accountable. Another approach is to conceptualize feedback-loops of these systems.

A problem in the theory of SESs is that ecological and social sciences have developed independently from each other and are not considered as one scientific discipline. This discourse has tended to develop simple models with prescribed universal solutions. Understanding such a system as a complex network requires the knowledge of specific variables and components as well as their relation.

Social dilemmas or tragedy of the commons are pivotal challenges in sustaining a balanced social-ecological system. The question arises mostly which institution has the highest interest of a finite common good and how it can be exploited until it collapses. The discussion here is how the commons of the systems can best be allocated and coordinated to attain all respective interests.

Rural-Urban Transformations (Bürkert and von Cramon-Taubadel, 2015; Jedwab et al., 2014)

Developing countries have rapidly urbanized since 1950 and it is projected that by the year of 2050 as many people will live in cities as currently live on our planet altogether.

In this context sustainable resource use and the distribution of ecosystem service provisions and consumption have become pressing issues. Urbanization is a major ongoing transition process in the social-ecological realm.

While the urbanization process of developing countries shares many similarities with that of developed countries in the 19th century, there are differences in several dimensions:

1. Urban growth has been faster in today's developed world.
2. While urbanization is highly correlated with income across countries, the world is becoming more and more urbanized at a constant income level.
3. Today's cities in developing countries are much larger – Mumbay, Lagos and Jakarta have the same population as New York, Paris and London, at a much lower income level.

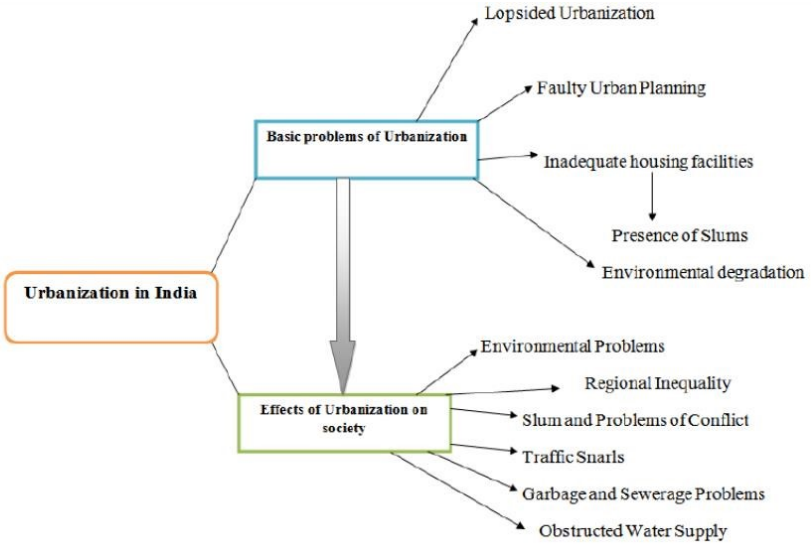
Standard models explain urbanization largely by rural-urban migration in response to an (expected) urban-rural wage (or utility) gap.
This utility gap could be the result of a rural push and/or an urban pull.

- Rural push factors
  - poverty, unequitable land distribution, environmental degradation, high vulnerability to natural disasters, and violent conflicts

    → Green Revolution, Rural Poverty Theory
- Urban pull factors
  - better employment opportunities, higher income, diverse services, and less social discrimination in the cities

    → Industrial Revolution, Urban Bias Theory, Resource Export Theory

Problems and effects of rural-urban transformations (Jaysawal and Saha, 2014)



Managing rural-urban transformations (McGee, 2008)

The rural-urban transformation in East Asia raises many policy challenges concerning the most effective way to manage the rural-urban transformation. Old divisions between rural and urban sectors must be replaced by planning that integrates urban and rural activities so that they adopt sustainable management strategies which utilize concepts of eco-systems in which rural and urban activities are linked, to create sustainable urban regions, cities and societies.
Management of the rural-urban transformation in East Asia does not involve the blind acceptance of transition models of urbanization from the "west". These countries should be developing their own response to the rural-urban transformation; that is, attempting to manage the interaction between global, national and local forces that drive the transformation using endogenous "adaptability" and adopting a form of "hybridity" in managing the rural-urban transformation process.

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INDIA'S GEOGRAPHY, CLIMATE AND ECOZONES

by Nadim El Nagi & Hannah A. Graef

1. Geography

Overview

- India is the seventh-largest country in the world
- Highest mountain of India Kanchenjunga (8598 m) while highest point is K2 (8611 m)
- Country borders: Pakistan (west)/ China, Bhutan and Nepal (Himalayan region)/ Bangladesh, Myanmar (east)

Physiographic Regions

Indo-Gangetic plains

- Encompassing most of northern and eastern India
- Named after the rivers Indus and Ganges
- Highly populated
- Main crops: Rice and wheat

Mountain zone of the Himalayas

- Forms India's northeastern border
- World's highest mountain range
- Originating rivers from this area flow through the Indo-Gangetic plain
- Main crops: tea and cardamom

Peninsular Plateau

- Landscapes of Peninsular Plateau are among the most ancient in the world
- Encompasses Deccan Plateau and eastern and western Ghats
- Main crops: rice in high rainfall areas, sorghum in low rainfall areas

Thar Desert

- located in western India (85%) and Pakistan (Cholistan Desert)
- Most densely populated desert in the world (83 people per km²)
- Main crops: maize, sesame, wheat, mustard and cumin (in canals)

2. Climate

Climatic Regions (after Köppen-Geiger climate classification):

- Tropical semi-arid climate (steppe)
- Sub-tropical arid climate (desert)
- Sub-tropical semi-arid climate (steppe)
- Tropical wet climate (monsoon)
- Tropical wet and dry (savannah)
- Sub-tropical humid with dry winters
- Alpine climate

India Meteorological Department defines **four climatic seasons**: **Winter** (January-February); **Summer** (March-May); **Monsoon** (June-September); **Post Monsoon** (October-December)

3. Ecozones

3.1 Prevailing ecozones

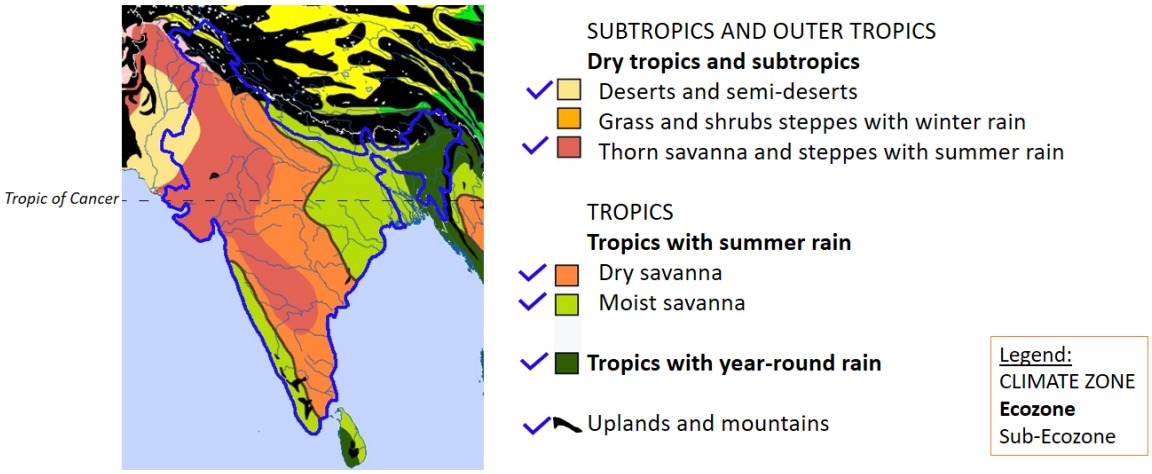

Figure 2: India's ecological zones, adapted from Schultz, J. (2005)

a) Dry tropics and subtropics:
   - 0-500 mm, vegetation adapted to drought conditions (absent to complete cover)
   - Partially nomadic grazing, limited crop cultivation (irrigated, in oases)

b) Tropics with summer rain
   - 500-1500 mm seasonal precipitation, vegetation: grass cover & scattered trees
   - Large mammals
   - High population density, small-scale farming (millet, maize,…)

c) Tropics with year-round rain
   - 2000-4000 mm rainfall in 2 peaks, heavy showers, no seasons
   - Vegetation: rainforest, low soil nutrient contents and pH values
   - Burning and shifting cultivation, deforestation

3.2 Minor ecozones

d) Subtropics with winter rain
   - Summer warm & dry, winter cool & wet, vegetation adapted to fire, drought and nutrient-poor conditions
   - Agriculture: tree crops (citrus, olives, etc.), annuals during winter (wheat, etc.)

e) Dry midlatitudes
   - Cold winter, hot summers, 2-4 months growing season with 100-200 mm of variable rainfall (total <600 mm)
   - Vegetation: grassland adapted to cold, salt and drought, herds of mammals
   - Large-scale grain farming, (semi-) nomadism

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GANDHI AND HIS NON-VIOLENT STRUGGLE FOR INDIA'S INDEPENDENCE IN JUSTICE

by Charlotte Junker and Marcelo Gerlach

Historical Background

In the 18th century, the British became more dominant in India which finally led to a collapse of the Mughal Empire and the foundation of the „British East India Company, BEIC". The introduction of harsh land taxes, social reforms, the expropriation of landowners and a general skepticism against Christian values lead to an Indian national movement. In 1857, particularly in the northern parts of India, the Indian Rebellion (Indian national movement) protested against the British hegemony. Those protests were beaten by the British Army and lead to the foundation of the "British Raj" (British Crown rule in India). Between 1858 and 1947 the Indian subcontinent was ruled by the British crown. About one half of the Indian subcontinent was directly administrated through the British, whereas the other part was indirectly administrated through loyal princes (Maharajas) who owned land and kept parts of their sovereignty by cooperating with the British (Figure 1).

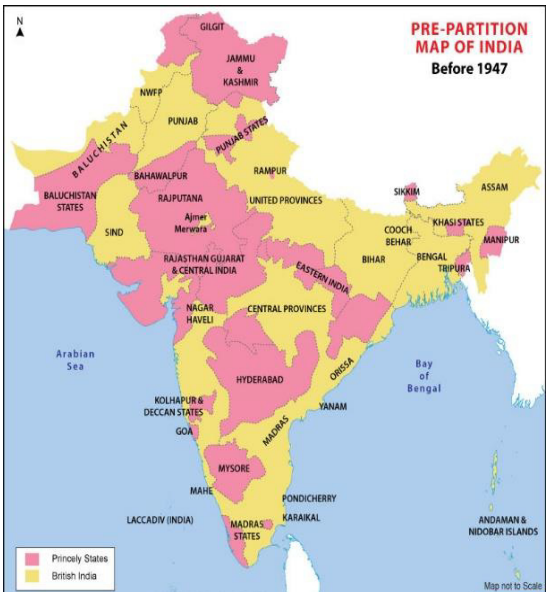

Figure 1: Map of India before 1947, violet= princely states, yellow= British Raj
https://www.ersaguier.org/crisisyestado/nacion.org/mapas.php

Two major religions were represented on the Indian subcontinent: Hinduism and Islam. The Hindu community was characterized through the caste- system, which places people in hierarchically ranked groups. Hindus and Moslems had been living together for centuries in a tense relation, with violent confrontations (Collins et al. 1976; Rothermund 2016).

The impact of the British rule on the Indian society

The British introduced some western oriented changes as, e.g., the end of slavery and widow-burning as well as the development of a railway system. A tax system was introduced to compensate high government spending (army costs), including land, forest and village taxes, that was enforced violently and led to a debt dependency among the rural population. The situation of the rural population was further downgraded by the change from subsistence-oriented agriculture to the production of export-oriented products such as cotton, tea, and jute. Additionally, the import of cheap textiles from GB was encouraged, which had the effect that millions of Indian weavers became unemployed (Jha 2013).

Gandhi's principles

Gandhi's fundamental attitude "Satyagraha" is based on the principle of non-violence and the willingness to take suffering upon oneself. By addressing the "enemies" conscience and heart, the circle of violence shall be overcome. This should be achieved through the concept of "swaraj", which means in Hindi self-rule or independence and which aimed to reject the British Raj and to create new reference points, systems, and structures that enable individual and collective self-development. The main strategy of Gandhi to reach independence from the British Crown was to call upon Indians civil disobedience to boycott all British-made goods, British schools and colleges, British courts of law, British titles and honours, British elections and elective officers and British taxes. The concept of "swaraj" goes beyond the disobedience of British Raj; it is a general political and epistemic project (Paranjape 2017).

Gandhi's vision for India- "a village-centric system"

The simple peasant life Gandhi was living functioned as a model for a free and economically independent India. He favoured a system with an absence of any political institutions and political leadership. This should be reached through decentralization and the empowerment of the villages, in form of an "enlightened anarchy", where each person will rule her/himself, but behaves in a way that her/his behaviour does not hamper the well-being of others and contributes beneficially to the community (Friedman 2008).

Indian Independent Movements between 1919 and 1947

The Jallinawala Bagh Massacre 1919

On 13 April 1919, around 10,000 men, women and children gathered at the Jallianwala Bagh to celebrate the spring Baisakhi festival. The British General Harry Dyer open fire and killed more than 400 unarmed civilians. This led to the First Non-Cooperating movement 1920-1922 (Muzaffar Alam 2019). As a response to the Jallinawala Bagh Massacre, this was one of Ghandi`s first organized acts of large-scale civil disobedience. The movement was to be nonviolent and to consist of Indians resigning their titles, boycotting government educational institutions, the courts, government service, foreign goods, and elections; and, eventually, refusing to pay taxes (Muzaffar Alam 2019).

The Salt March 1930

The march was the second act in an even-larger campaign of civil disobedience. Gandhi expressed disagreement against British rule in India. The march extended into early 1931 and garnered Gandhi widespread support among the Indian populace and considerable worldwide attention (Muzaffar Alam 2019).

The Quit India Resolution 1942

Gandhi declared that the British presence in India is a provocation for Japanese forces and demanded the British to leave Indian to deal with the Japanese by non-violent means. In a few months all members of the Congress High Command were arrested together with over 60,000 people (Romila Thapar 2019).

The Partition of India 1947 and Later Development

Mohammad Ali Jinnah, leader from the All India Muslim League, demanded for an autonomous and sovereign Pakistan. So, there should be a territorial readjustment. Gandhi and the Indian National Congress were unable to persuade the Muslim League to have a shared country. On 15 August 1947 India gains independence from Britain after being divided into two separate nations, India and Pakistan (Mann 2014)

January 30, 1948 - Mahatma Gandhi, leader of the independence movement, is assassinated.

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NEHRU AND THE DIVIDE OF THE INDIAN SUBCONTINENT

by Johanna Reger & Florian Holz

The Divide of the Indian Subcontinent

1. The Great Partition

… was the division of British India into the two countries of India and (East & West) Pakistan when the two countries were becoming independent in 1947.

… was caused by a religious conflict between Muslims on one side and Hindus & Sikhs on the other side, in short:

When British rule in India was about to come to an end, Muslims were afraid that they would be the minority in a Hindu dominated democracy. Thus, some Muslims (the Muslim League) promoted the idea of a separate Indian nation of Muslim religion. Hindus (represented by the Indian National Congress), on the other hand, wanted to remain with one state.

Muslim League

vs.

Indian National Congress

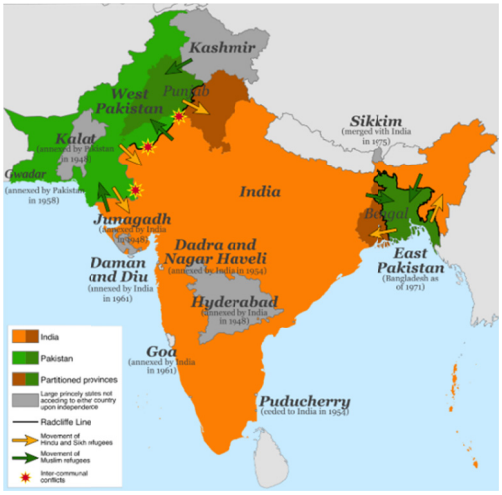
2. Historical Background

- *Hindus, Muslims and Sikhs lived peacefully together for centuries*
  - Different cultures, value systems, and taboos about purity had been there before.
  - There *had* been conflicts and warfare before *but* soldiers in the pre-European wars would have considered their religious affiliations in much more localised and less universal ways.
  - only after 1st World War: 30 years of increasing hostility. This was mainly due to the British strategy of "divide and rule". They deliberately raised awareness about religious differences.
- *Increasing hostility*

3. Timeline: The Events Leading to the Partition

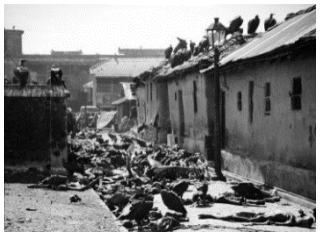
23.03.1940	Lahore Resolution: First public demand for a Muslim state
2nd World War	Ending with economic crisis in British India, mismanagement by British rule leads to hunger and millions of people dying from starvation
01.1946	Elections: First democratic elections in India end in polarization on the question: Pakistan or united India?
03.-07.1946	Cabinet Mission: British try to build a federal state with high autonomy for Muslim regions fails due to provocating speech by Nehru.
16.08.1946	Great Culcatta Killing: First ethnical cleansing following demonstration for a separate Muslim state, after which violence spreads to the hole country.
03.06.1947	Plan to partition subcontinent agreed and made public
14.08.1947	Independence Day in Pakistan
15.08.1947	Independence Day in India
17.08.1947	Announcement of final borders

4. The Map



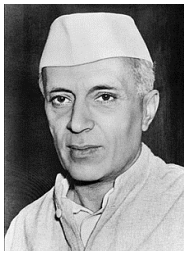
5. The Catastrophe

- Partition ends in horrific violence between Muslims and Hindus & Sikhs
- 500,000 to 1,000,000 casualties
- 75,000 to 100,000 women kidnapped and raped
- Migration of some 12 million people between Pakistan and India



JAWAHARLAL NEHRU

1. Jawaharlal Nehru and the Indian Independence Movement



Jawaharlal Nehru was born in a well-connected, affluent, important political family of emerging Indian middle class (Hindu-Brahmin) and received education in England (Cambridge and London) where he got in contact with a 'western way of thinking' which strongly influenced his following political work.

Nehru got famous as a major leader of the Indian nationalist movement, advocating together with Gandhi a non-violent movement for a united independence of India.

2. Nehru as First Prime Minister of Independent India

- For Nehru, 'Modernization' was India's national philosophy. He introduced seven 'national goals' that he wanted to implement with the help of several 5-year-plans:
  1. National unity
  2. Parliamentary democracy,
  3. Industrialization
  4. Socialism
  5. Development of scientific temper
  6. Secularism
  7. Non-alignment
- **Challenges**: During the drafting of the 3rd 5-year-plan, the 'Modernization' was lagging behind, contradictions of class remained and the contrasts between rich and poor grew greater. Reasons were inflation, a lack of foreign currency, difficulties of planning and a lack of internal resources.
- **Achievements**: Nehru was largely responsible for the creation of a democratic parliamentary system of government. He further strengthened the independence, set up an industrial base and a strong public sector and abolished the old feudal system, developed the public education and health system and took important steps in order to ban restrictions going with the caste system.

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TODAY'S GOVERNMENT POLICIES: INTERNAL AFFAIRS AND ATOMIC POLICY

by Marlene Kühling & Li Kathrin Kaja Rupieper

1. India's political system, Hindu-Nationalism and the rise of the Bharatiya Janata-Party

India is the largest democracy of the world with 834 eligible voters in 2014. Its political system is based on three independent pillars; Executive, Legislature, and Judiciary. The legislative part is split into a lower and an upper house (Lok Sabha and Raiyha Sabha). Ramnath Kovind is India's current president (head of state) and Narendra Modi is the prime minister (head of government). Next to the Indian National Congress (INC), the Hindu-Nationalist Bharatiya Janata-Party (BJP) has become one of the major parties in parliament in recent years. For the first time, the BJP managed to become the strongest power in 1998, the year of the first Indian underground nuclear tests. This provocation of Pakistan was accompanied by ongoing tensions in Kashmir: the Pakistani occupation of Indian territory (Kargil) in 1999 and the occurrence of several attacks by Muslim terrorists in the early 2000s lead to growing anti-Muslim and anti-Pakistani tendencies in the Indian population. At the same time - thanks to the booming high-tech revolution - the country experienced an unprecedented economic boom. Therefore, in 2004, the BJP ordered early elections. Surprisingly, the INC won and managed to stay in government for two election periods. Their legislature was accompanied by a further economic upswing. However, India remained a victim of further terrorist attacks and the trust put into the government diminished since 2010/11 as economic growth declined and a series of corruption cases were revealed. In 2014, the BJP, led by Narendra Modi, recorded a landslide victory in the general elections and is now holding the absolute majority of parliamentary seats. The latest initiatives of the Modi government include the „Program Digital India", demonetization, „Bank accounts for all" and „My clean India".

2. India's Nuclear Policy

1948	Nehru founded the Indian Atomic Commission (IAEC)
1962	Start of the Indian nuclear weapons program
1970	Nonproliferation treaty: By forbidding further proliferation of nuclear weapons, the nuclear world order from 1970 was established
1998	Nuclear weapons tests: It became obvious that India violated this treaty, international sanctions were the consequence
2006	treaty between the US and India concerning the peaceful use of nuclear power as well as military support in case of need (geopolitically advantageous from the US perspective; from Indian perspective: interpreted as being superior to Pakistan as there is no such treaty with Pakistan)
2008	total removal of sanctions, since then: import of nuclear technology, mainly from France, Russia, and the US

The Indian nuclear policy follows the principles of "no first use" and minimal deterrence. As the IAEC operates all nuclear power plants as well as all nuclear research centers, civil and military usage are strongly interlinked. As energy shortages often cause blackouts, the building of new nuclear power plants is intensified but some projects are accompanied by local protests. Some protests root in the location of the new to be constructed nuclear power plants, some in the way of 'land acquisition'. In addition, the disposal of nuclear waste is discussed as being a minor matter. Another criticism towards Indian nuclear politics is that there exists no public or parliamentary control: The IAEC is under direct and sole control of the prime minister. But overall, atomic energy is perceived mainly positive.

3. Internal Affairs: "Unity in Diversity"?

The Kashmir Conflict: India's Nuclear Policy Agenda is strongly interwoven with the Kashmir conflict. The tensions in the region are still ongoing. The latest attack occurred in 2018 on a military base in Uri and is said to be the hardest attack in the last two decades. To date, both India and Pakistan claim the entire area of Kashmir for themselves. The reasons for the conflict are historical and identical and the radicalization of the Islamists in recent years coincides with the political rise of the Hindu nationalists.

Naxalite-Maoist insurgency: The Naxalites are far-left radical communists who follow a Maoist political sentiment and ideology and strive for the violent establishment of a communist social order. They control small parts of the Indian territory and regularly carry out attacks on security forces, political opponents, and public infrastructure. The most affected states are Chhattisgarh, Andhra Pradesh, Telangana and Maharashtra. Their origins lie in the 1960s when an uprising of poor farm workers against injustice, oppression and exploitation in the village of Naxalbari took place. The reasons for the movement have a rather socioeconomic determinant (inequality, unequal distribution of farmland, sub-caste and indigenous population).

Insurgency in Northeast-India: The third ongoing conflict is located in India's northeastern states, where multiple armed factions are operating. The most affected states are Assam, Manipur and Nagaland. Conflicts arose between the central government and militant independence or secessionist movements as well as between ethnic groups and tribes living in the region: Some fractions strive for the building of an independent state while others seek regional autonomy. Reasons for the conflict are of an ethno-political nature and include problems of land and income distribution.

4. Conclusions

India's society is shaped by a traditional multiculturalism, in which different denominations, ethnic groups and social strata live mostly peacefully together. For the time being, the danger of a nuclear war caused by India can be ruled out. Nevertheless, internal conflicts remain the order of the day. The seizure of power by the Hindu nationalist BJP has led to an increase in violence between religious communities. Until today, a solution for the Kashmir conflict has not been found and the socio-economic and ethno-political conflicts of the Maoist "People's Liberation War" and the autonomy and secession efforts in the remote Northeast continue at a low intensity.

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LEPROSY IN INDIA: A PUBLIC HEALTH CHALLENGE

by Rose Baucher

Leprosy, also known as Hansen's disease, is a chronic infectious disease caused by a bacteria called *Mycobacterium leprae*. Contrary to common belief, leprosy is not a highly infectious disease. Transmission requires close and prolonged contact. The principal means of transmission is by aerosol spread from infected nasal secretions to exposed nasal and oral mucosa. Around 95% of the world's population is naturally immune.

It is a disease with a long incubation period; the first symptoms appear on average two to five years after the infection. The disease causes skin and nerve damage. Without treatment, these lesions progress and become permanent, affecting the skin (ulcers), nerves (decreased sensation), limbs and eyes (blindness).

Leprosy is curable, with a combination of three drugs known as multidrug therapy (MDT): *Rifampicin*, *Clofazimine* and *Dapsone.* This therapy usually lasts one year and is free of charge to all patients worldwide since 1995 (funded by the World Health Organisation).

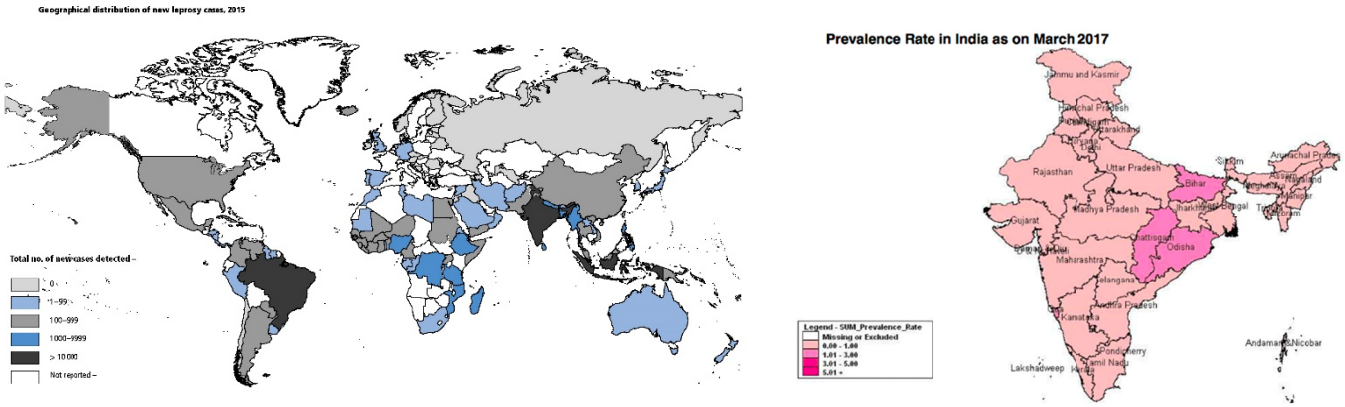
Historical aspect

Leprosy is one of the oldest diseases known to man. India is considered as the point of origin of leprosy, a skeleton dating from 2000 B.C. was found with evidence of the disease.

Historically, leprosy strikes fear in the society as a mutilating, disfiguring, contagious and incurable disease. In the Middle Ages, the victims were excluded from the society and were isolated in lepers' colonies outside the cities. In 1873, Henril Armauer Hanser discovered the bacteria *Mycobacterium leprae* that causes the disease. In 1983, an effective treatment was finally found.

Epidemiology

In recent years, the majority of the new cases have been reported from just three countries: **India**, **Brazil**, and **Indonesia**.



Source: WHO 2016

India has made a big progress in reducing the number of cases. In 1983, the prevalence rate was 58 cases per 10,000 people. In 2005, India announced that it had eliminated leprosy as a public health problem. However, this only means that there is less than 1 person in 10,000 infected with the disease. Today, challenges remain: 130,000 new cases are reported each year in India, which represent 58% of all cases in the world.

It is essential to determine the factors that contribute to its persistence.

- Socioeconomic factors: low educational level and experience of food shortage at any time in life.
- Environmental factors: a low frequency of changing bed linen and regular bath in stagnant water.

Though leprosy is not a disease of the poor, it affects poor to a much greater extent because of their social and economic vulnerability.

Stigma and discrimination

Because of the horrifying nature of the physical disfigurement and since no cure was discovered until the 20th century, leprosy has, for centuries, been a highly stigmatizing disease. The stigma attached to leprosy leads to loss of employment even before manual labor becomes more difficult due to disability, which often results from late or no treatment. It also leads to exclusion from society, causing physical and emotional distress.

Even to this day, when leprosy is completely curable, some parts of India uphold the belief that leprosy is a divine curse, a punishment of the past sins, and a result of immoral sexual behavior. The repulsive physical image, the fear of infection and the belief that it is incurable are the root causes of the inhuman treatment that is often meted out to those who have leprosy.

The historical legacy and societal stigma toward leprosy are evidenced by various laws containing discriminatory clauses against leprosy victims. Some states of India prohibit leprosy patients from running in local elections. Other laws restrict the patients from obtaining a driving license and from traveling by train.

National Leprosy Eradication Program (NLEP)

NLEP is a health scheme of the Ministry of Health and Family Welfare, Government of India, to eradicate leprosy in India. It was launched in 1983 as a continuation of the National Leprosy Control Program of 1955.

Objectives:

- Early detection through active surveillance by trained health workers
- Regular treatment of cases by providing Multi-Drug Therapy (MDT) at fixed in or centers a nearby village of moderate to low endemic areas/district;
- Conducting health education and public awareness campaigns to remove social stigma attached to the disease.
- Appropriate medical rehabilitation and leprosy ulcer care services.

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THE INDIAN ECONOMY AND THE ROLE OF AGRICULTURE & FORESTRY

by Jana Bauer & Imke Hellwig

1. Introduction

Within the last decade, India became one of the fastest growing economies worldwide, recording an average growth of the GDP of 7.3% (2014-17). Nonetheless, the country has to deal with the vital issues of poverty, corruption, malnutrition and inadequate public health care.

2. History

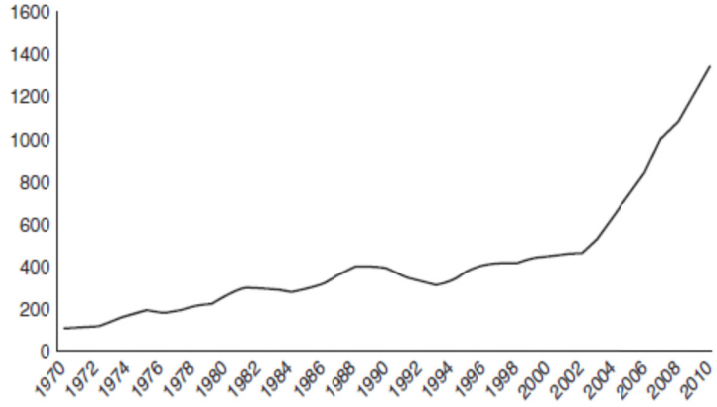
For almost one century, India has been under British rule. Government policies where far from encouraging development, eventually leading to de-industrialization and a near stagnation in economic growth.

After Independence (1947), economic policy adopted the principles of social democracy and planned economy (Five-Year Plans of India). Annual growth rose to 3 - 3.5% in the next three decades. In the 1960s, India had a successful Green Revolution, increasing agricultural productivity and lowering the risk of famines. Growth picked up through the 1980s, when changed policies started to free up markets and eased controls.

A combination of circumstances led to the economic crisis in 1990/91, which enabled India to implement rigorous political changes and economic reforms in favour of liberalization.

3. Recent development

Since the economic liberalization in 1991, the average annual growth of the GDP rose to 6-7%.



Gross National Income per Capita, 1970-2010. Source: Tomlinson 2013

Agriculture

- India is the largest producer of spices, pulses, milk, tea, cashew and jute; and the second largest producer of wheat, rice, fruits and vegetables, sugarcane, cotton and oilseeds. Further, India is second in global production of fruits and vegetables, and is the largest producer of mango and banana (IBEF).
- Among the 15 leading exporters of agricultural products in the world.
- Nevertheless, the share of agriculture to the national GDP has been declining (17% in 2013-14).
- Still agriculture remains important for India, as >70% of population live in rural areas and around 60% of the population is employed in the sector.
- The government of India has introduced several projects to assist the agriculture sector.
- Since 2000: National Agricultural Policy (NAP) as a comprehensive approach covering almost all dimensions of Indian agriculture.

- Efficient use and conservation of natural resources.
- Usage of wasteland for agriculture and afforestation.
- >4% annual growth: equal across regions and farmers; demand-driven (strengthening domestic markets, benefiting from exports); sustainable (technologically, environmentally, economically).

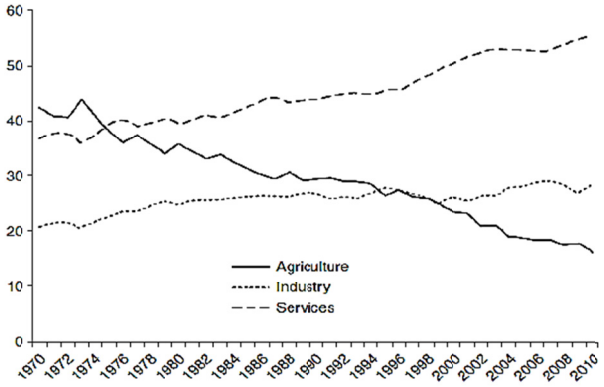


Figure 5.3 Value added by sector (percentage of GDP), 1970–2010

Forestry

- Trade deficit over the past 10 years from US$ 1.0 billion (2001) to more than US$ 5 billion (2011) (risiinfo.com) → India is a net importer of forest products.
- 2008-09: Forestry accounted for 1.7% of the total GDP of the country.
- Forest produce: timber, non-timber and minor minerals.
- Significant forest products: paper, plywood, sawn wood, timber, poles, pulp and matchwood, fuelwood, sal seeds, tendu leaves, gums and resins, cane and rattan, bamboo, grass and fodder, drugs, spices and condiments, herbs, cosmetics, tannins.
- Key species: eucalyptus, poplar, teak, bamboo, other fast-growing hardwood.

4. Conclusions

The primary sector experiences a declining relative economic importance. Yet, the major share of India's population lives in rural areas and mostly has a low level of education. Thus, reliance on agricultural employment remains high.

The focus on agricultural and forestry productivity and structural change in rural areas is a key factor to alleviate poverty.

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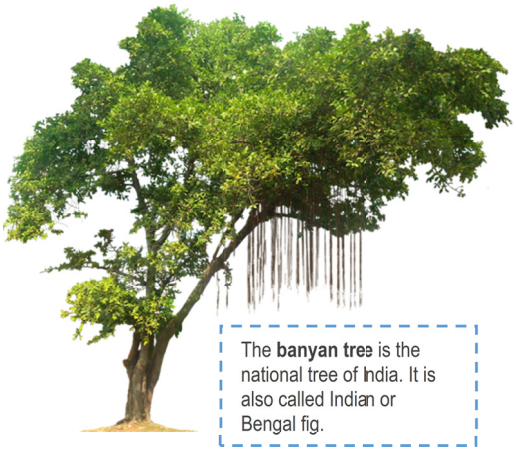


The **banyan tree** is the national tree of India. It is also called Indian or Bengal fig.

FORESTS, NATURE CONSERVATION AND TOURISM: PAST DEVELOPMENTS AND PRESENT POLICIES

by Ieva Bebre & Leon Bessert

Forest in India is defined as all tree stands with canopy density over 10% having an extent of more than 1 ha, including bamboos, orchards, coconut, palm etc. (FSI, 2017).

Forest cover	*Vision*	*State of degradation*
21.54%	**33%**	**≈ 41%**
The total forest cover of the country is 708,200 km² of the geographic area (FSI, 2017)	The country aims to increase the forest cover to 33%.	It has been estimated that nearly 41% of the country's forest cover has been degraded to some degree (WRI, 2014).

Until 1988 India's forest policy mainly concerned timber production for commercial purposes and lacked actions towards combating deforestation and forest degradation. **National Forest Policy (1988)** was a landmark in India's forest policy because for the first time it recognized the importance of local people's involvement in forest management and the protection of forest resources (Behera and Engel, 2006). Subsistence requirements, soil protection, and forest conservation became the focus of the new forest policy.

In a follow-up document issued in 1990, the central government provided guidelines to all state governments to implement **Joint Forest Management Systems** by transferring everyday forest use and management rights to the community in order to regenerate degraded forest and improve living standards (GOI, 1990).

Nearly 275 million poor people in India (more than a fifth of the population), especially tribal communities, depend on forests for subsistence and livelihoods. Almost 50% of the food requirements of forest dwellers are provided by forests.
Source: WRI, 2014

The importance of **non-timber forest products (NTFP)** had been largely overseen in India, resulting in a loss of forest cover. Until recently, it was considered economically justifiable to convert dry-deciduous forests to other land uses on the account of low timber stock and neglecting the value of NTFP. Even forestry development programmes and compensatory afforestation schemes aimed primarily at improving timber yield, largely ignoring the NTFP management (Mahapatra and Tewari, 2005).

Numerous legislations currently stipulate the forest management practices, e.g.:

- Indian Forest Act (1927)
- Forest (Conservation) Act (1980) and The Forest (Conservation) Rules (1981, updated in 2003)
- National Forest Policy (1988, updated in 2018)
- Compensatory Afforestation Fund Management and Planning Authority - CAMPA (2009)
- National Mission for a Green India – GIM (2014)
- National Afforestation Programme – NAP (2006)
- Wildlife Protection Act (1972) and The Wildlife (Protection) Amendment Act (2006)
- The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (2006)

Nature protection

Environmental Protection Act, 1986, including two notifications:

- Coastal Regulation Zone Notification, 2006
- Environmental Impact Assessment Notification, 2006

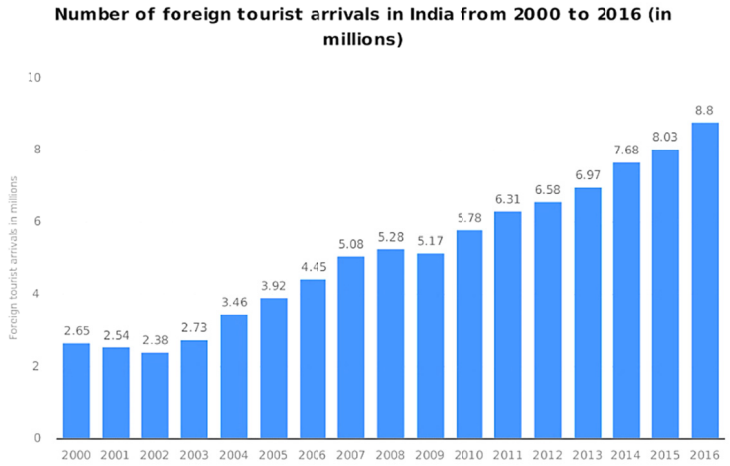
National Biodiversity Strategy and Action Plan (NBAP)

The NBA draws from the principle in the National Environment Policy that **human beings are at the centre** of concerns for sustainable development and they are **entitled to a healthy and productive life in harmony with nature.**

India is a megadiverse nation housing around 10% of the world's species. Unfortunately, due to population explosion, climate change and lax implementation of environmental policies, several species are facing the threat of extinction. Not only does this affect the food chain, but also the livelihood and the culture of millions of Indians who depend on local biodiversity.

Source: Biodiversity of India

Tourism



The travel and tourism industry contributed 208.9 billion U.S. dollars do Indian GDP (2006), i.e. 9.6% of India's total GDP.

Second highest total tourism GDP contribution in Asia-Pacific behind China (2006).

25.4 million jobs are provided by the travel and tourism industry in India (2006).

Source: Ministry of Tourism

Ecotourism

Definition of The International Ecotourism Society: *"**Responsible travel** to natural areas that **conserves** the environment and improves the welfare of local people".*
Travel industry's definition: *"**Purposeful travel** that creates an understanding of cultural and natural history, while safeguarding **the integrity of the ecosystem and producing economic benefits that encourage conservation** […] The long-term survival of this special type of travel is inextricably linked to **the existence of the natural resources** that support it"* (Bandy, 1996).

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INDIA'S GREEN REVOLUTION AND TODAY'S WHEAT AND RICE CULTIVATION

by Manuel Schuler & Katharina Hemmler

1. Historical background

- 1940 beginning of Mexico's Green Revolution due to research by Norman Borlaug "Father of the Green Revolution"
  → success in producing more agricultural products
- Green Revolution technologies spread worldwide in the 1950s and 1960s
- The following technologies were used during the Green Revolution
  → High-Yielding Varieties (HYVs) of cereals
  → Chemical fertilizers and agro-chemicals
  → Controlled water supply
  → New cultivation methods
- The Rockefeller Foundation and the Ford Foundation founded research worldwide
- Results:
  → 1960 International Rice Research Institute - Philippines
  → 1963 The International Maize and Wheat Improvement Center - Mexico
  → 1960 beginning of India's Green Revolution

2. India's Green Revolution

- In the early 1960s India faced mass famine
- Borlaug and the Ford Foundation were invited to India to do research
- The Green Revolution spread technologies that already existed, but had not been widely implemented outside industrialized nations
- Main methodologies during the Green Revolution
  → New variety of rice, which produces more grains of rice per plant
  → Imported wheat seed from the International Maize and Wheat Improvement Center
  → Modern irrigation systems
  → Use of pesticides and synthetic nitrogen fertilizer
- Rice variety used during the green revolution:
  → IR8 – a semi-dwarf rice: this variety could produce more grains of rice per plant when grown with certain fertilizers and irrigation
  → IR 8 rice yielded about 5 tons per hectare with no fertilizer and almost 10 tons per hectare under optimal conditions. This was 10 times the yield of traditional rice.
- Wheat variety used during the green revolution:
  → High-Yielding Varieties with rust resistant strains of wheat.

3. Achievements of the Green Revolution

Increased food production & increased yield

	1950/51	1969/70
Total grain production	~ 50 million tons	~ 100 million tons

Especially the Mexican dwarf wheat did very well

Results:

- For India: self-sufficiency in food production
- For many farmers: higher profits

- For consumers: lower food prices & health benefits
- Nobel Peace Prize to Norman Borlaug for his work of creating "a new world situation with regard to nutrition". He is credited with saving over a billion people from starvation.

4. Downsides of the Green Revolution

4.1 Environmental effects

Environmental degradation is caused by:

Expansion (increased agricultural area) and intensification (main factor), which includes:

- The extensive use of chemical fertilizers and pesticides
- The planting of monocultures
- Irrigation systems

The resulting environmental problems are:

- Polluted soils
- Loss of soil fertility
- Water contamination
- Changes in the ground water table

4.2 Social and political effects

Increased inequalities:

- Regional disparities: wheat regions benefitted more than rice regions
- Intraregional disparities: poor farmers are not able to borrow money to improve their farming techniques → negative impacts: no additional revenue; price drop due to the productivity gains of the other farmers
- Possible negative impact on landless laborers

5. Today's wheat and rice cultivation

- Second largest producer of rice & wheat (after China)
- Total rice production has increased by 430% from 1950 to 2014
- HYV area = 44%
- Fertilizer consumption increased

	1970	2015
Total fertilizer consumption (kg per hectare arable land)	~ 11	~ 170

- Many indebted farmers (example of Punjab: 9 out of 10 farmers are in debt)
  → high rate of suicides

6. Conclusions

- The peaceful green revolution helped India to become one of the world's leading rice producers

Positive effects:

→ Food security
→ Economic boom
→ Greater wealth for many

Negative effects:

→ Soil degradation & pollution
→ Exploitation of ground water
→ Increased inequalities
→Disagreement on the topic among scientists

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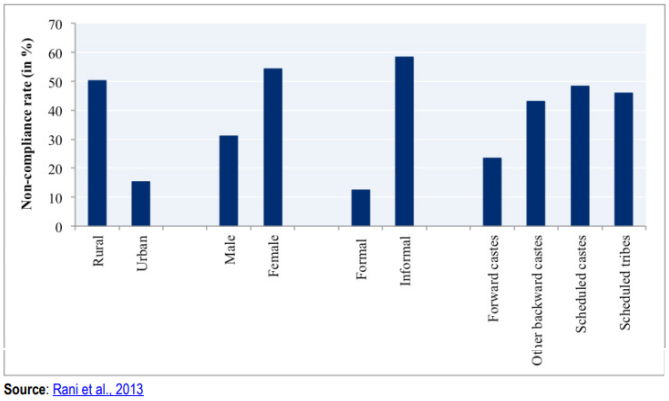
DECENT WORK IN INDIA: EXAMPLES OF SUGAR CANE, COTTON AND TEA

by Marie Camille Mathieu & Yakima Schwenger

Before going more into details of the working conditions of the labour force in sugar cane, cotton and tea plantations, it seems important to explain more about the working situation and the organization of the labour market in India. Indeed, lots of different categories can be found, and sometimes defy or can be combined with each other. These main categories are the illiterate and literate labour force, the permanent and casual workers, formal versus informal workers, and local labour force compared to the migrants. The illiterates are usually finding more jobs than the literate ones without other qualification. The casual workers in India represent 1/3 of the total labour force.

The informal market provides the largest majority of the jobs in India compared to the formal one, and especially in rural areas. This is indeed where we find most of the agricultural jobs. These workers are highly vulnerable and especially lack of protective laws exposes them to indecent working conditions. The migrant (interstate) workers are mainly hired as informal workers and are also fragile especially because they often have different language and culture, which creates tensions with the locals.



Source: Rani et al., 2013

Fig. 1 Non-compliance rate in India, by different categories of workers, 2009-2010

But a major problem in the agricultural sector is that even if many laws have been implemented for improving decent work, it is more complicated to control them compared to urban areas. For example, the Minimum Wage Law isn't respected for half of the jobs in rural areas.

Tea production is a major agriculture sector, with India being the second producer in the world. Even if some laws of protection of the workers have been implemented before Independence, it's only after 1947 that real improvements were taking place. One can especially name the Plantation Labour Act (1951). It made certain conditions compulsory, such as providing free drinking water, medical but also educational facilities for the children. But measures are considered as too costly by the plantation owners so isn't perfectly implemented. The wages have increased (even indirectly, thanks to the so called NREGA program) but the tea workers still have low wages in India.

Furthermore, some basic needs like decent hygiene conditions in the workers houses are not implemented universally. On the topic of fertilizer application - even if protective equipment is distributed, it is not always used by the workers. Finally, being regrouped in unions is a right for the workers since Independence, but the workers recognize that they are often not free in their choice of union.

As far as perspectives of improvement towards more decent conditions of work in sugar cane, cotton and tea plantations are concerned, we could first raise the question of increasing the awareness of the workers about their rights, this is by the way what unions are supposed to do. Finally, certified agriculture like "Fair Trade" can also be a way to increase the responsibility of the farms, in terms of decent work standards. So the European consumers also have their role to play in enhancing better working conditions in India.

Cotton (*Gossypium*) is an agronomic production sector which influences indirectly 50 million of people in India, having a major effect on the population. The introduction of GMO Bt cotton seeds has led to controversial opinions on the agriculture cause-effects by trapping farmers into high seed prices, higher input costs, and increase of farming practice requirements, among others.

The latter led to high loan indebtedness by farmers and consequently to the high suicide rate among smallholder cotton farmers.

Environmental and social externalities have a certain importance with respect to improvement of working conditions for farmers (Fig. 2).

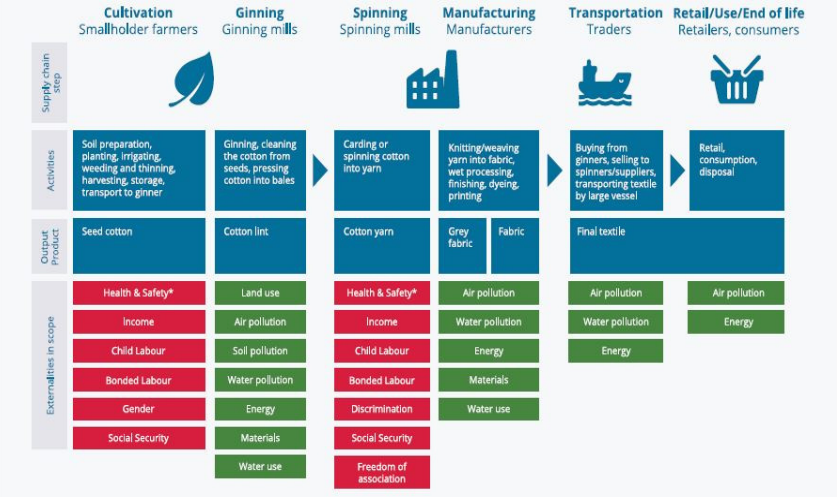


Fig. 2 Environmental and social externalities of cotton production

The main social costs are observed in the cultivation and the spinning phase, which are also the phases that require more labour. Health and safety protection laws are not applied, income security is not respected, and provision of alternatives for farmers to adopt in their production system is not available (Bt cotton). Sustainable cotton production and the introduction of more certification standards (Fairtrade, Better cotton) can both have a positive effect in improving workers' wages.

Sugarcane (*Saccharum officinarum*) has a major social influence, due to the migration of working forces. Coming from all over India, a huge migration flow of workers has been witnessed, all hoping to improve financial and educational conditions for their families. By six months stay in one of the main sugarcane producing states (Gujarat, Maharashtra and Karnataka), families are split or living under very poor conditions near the sugar factory. In hope of providing a brighter future for their children, parents have difficulties in choosing which of their children is the lucky one to go to school.

The rest have to help on the fields as income does not allow more. Not only the heavy work and working risk is not compensated but also pesticides have been causing health problems.

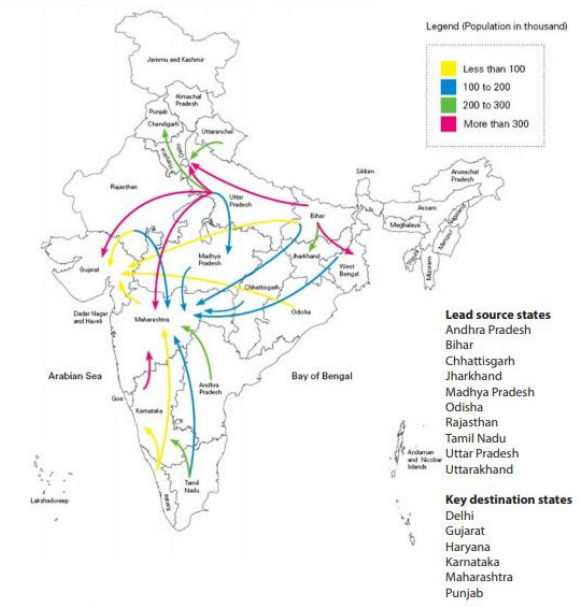


Fig. 3 Major migration flows in India

Farmers who are not aware of their rights and who are suffering from companies and land owners aiming for profit are taking the best of which this country could be a leading state, both at the social cooperative level and sustainability in agricultural production.

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URBAN AND PERI-URBAN PRODUCTION OF VEGETABLES AND TRADITIONAL FOOD - AN OPTION FOR SLUM DWELLERS?

by Scott Appleby & Maximilian Ibing

1. Introduction

The world's population is growing rapidly and will surpass 8 billion in the near future, according to the World Bank (2018). But not only the overall population will increase. Especially the number of people living in urban areas will increase much faster, compared to those in rural areas. Mainly based on the general increasing population, but also due to migration. Urban areas will be gaining in importance, regarding food production and security (World Bank, 2018).

2. Urbanization and the need for food

Not only the overall urban population will increase rapidly, but also the urban demand for food. It is expected that the urban demand for perishable goods such as vegetables will increase twice the rate of rural areas (Brockerhoff, 1998; Research Institute, 2017). This is mainly due to changing consumption patterns and diets. Another factor is that while urban inhabitants are more likely to witness an increase in income, they are more likely to substitute staples from their diet with perishable goods, such as animal-based products or vegetables and fruits (Midmore and Jansen, 2003; Allender et al., 2010).

3. Urban and peri-urban Agriculture

There are some differences for the developed world and developing countries. One of those is the place where agriculture takes place. While it is common in developed countries that agricultural is mainly carried out in rural areas, in developing countries, there is a lot of agriculture taking place in urban and peri-urban areas, the urban and peri-urban agriculture (UPA) (Smit et al., 1996). The UPA itself has some very own characteristics. This becomes clear when looking at demand, inputs and outputs.

Figure 1; Pesticide use in UPA, Gupta, (2017)

While RA uses often water from boreholes, wells or streams, UPA often relies solely on the use of sewage, or wastewater (Bradford et al., 2003). Inputs in general like labor and agrochemicals are often easier accessible in the urban context and therefore, the use of those is more likely. UPA production often favors the production of perishable outputs (Dinham, 2003; Rees, 1997).

Figure 2; Wastewater use in UPA, Ensink et al. (2002)

4. The production of perishable goods in UPA

Estimates from literature assume that some 800 mil. people engage worldwide in UPA and that some, especially African cities, are able to provide up to 75% to 100% of the vegetable demand by UPA (Drechsel et al., 2006). RA often aims at either fulfilling the needs of the locals (= production of staple goods) or production for the international market (= cash crops). A production of perishable goods may also take place, but demand is lower in rural areas and markets that are further away like urban areas are often not accessible because of a lacking cool chain. At the same time post-harvest losses are greater in RA compared to UPA (Midmore and Jansen, 2003). UPA instead often focusses on the urban demand, and therefore plays an important role in the production of perishable goods such as vegetables and milk. The production of those is mainly favored due to an enhanced market access, the no need for cool chains, marketability and a higher profitability (Jansen et al., 1996).

But there are also some drawbacks of the UPA vegetable production. Often it comes along with an enormous use of pesticides. Applications on a weekly or even more frequent basis are reported. Issues also arise from the fact that the whole value chain has little or no knowledge about the (safe) use of pesticides. Smallholders who engage in UPA, are often unable to participate in international trade, because they are unable to meet the requirements of minimum residue levels (Dinham, 2003). The usage of wastewater in UPA can be seen as advantageous, as it somehow is able to recycle nutrients within the system. But on the other hand, the constant contact of farmers with it may harm their health. Wastewater is also likely to increase not only the amount of weeds but also the problems with pests (Dinham, 2003).

Next to vegetables, UPA also offers the possibility to produce milk (-based) products, and to profit thereby from the issue that a cool chain is less relevant. While it provides nutritious food for the poor, and also traditional food, dairy livestock keeping comes with some issues, like the difficulties to encounter fodder of high quality or the fact that livestock keeping in an urban context can often be seen as a vector for diseases. Especially the consumption of untreated milk is often considered to be closely linked to diarrhoea (Prasad, 2018).

5. Options for slum dwellers

The UPA production of vegetables comes along with numerous benefits such as it provides relatively cheap and healthy/nutritious food for the urban poor, it generates employment opportunities and income possibilities. Due to the production techniques it can also combat waste and wastewater issues, by using them as inputs for fertilizing and irrigation (Midmore and Jansen, 2003; Bradford et al., 2003). Generally, it can be said, that those who engage in UPA are relatively better off than those urban poor who do not.

6. Future outlook

The situation of slum dwellers who participate in UPA can be improved in the future by enhancing their understanding and knowledge of the safe and professional use of pesticides. To stabilize production and output quantities it would be promising to grant them secure land titles and enable access to international markets in the long run.

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VERGHESE KURIEN AND THE CATTLE REVOLUTION IN INDIA

by Annelise Havill & Fridtjof Hansen

Milk in India

→ holy cow! → culturally as well as **dietary** (lacto-vegetarian) very important
→ urbanization → where to get the milk?

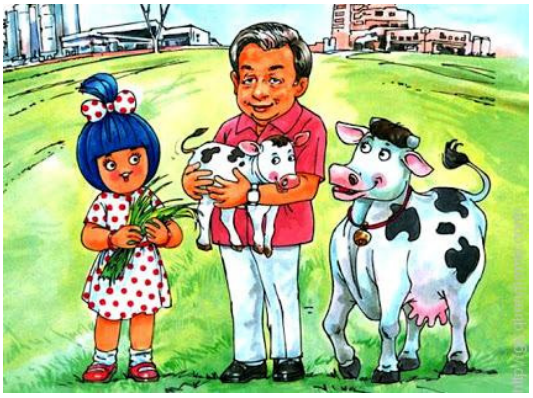

Figure 1; Verghese Kurien (Photo from; Vijayendra, T. (2017)

Verghese Kurien

Verghese Kurien, known as the "Father of the White Revolution", was born on November 26, 1921 into a Christian family in Calicut, now Kozhikode. Verghese graduated in 1940 and 1943 with a Bachelor of Science and then a Bachelor of Mechanical Engineering from Loyola College at the University of Madras. He then moved on to a Master of Science and Mechanical Engineering, in which he graduated with Distinction, from Michigan State University. During his masters, he completed special studies in engineering at Tata Iron & Steel, now known as Tata Steel. Along with this training he also completed 9 months of specialised training in dairy engineering at the National Dairy Institute of Bangalore. The studies that Verghese completed after his bachelors were sponsored by the Indian government, so he was required to work for the dairy department of the government of India as a dairy engineer, in Anand. During this time, he went on government sponsorship training in dairy technology to New Zealand and Australia in 1952 and '53.

Milk production before Kurien

→ govt. tried to improve milk production in 1960s → cattle colonies & processing plants in cities → no effect
→ rural producers left behind → dependent on middleman who made big money, processing and selling milk to the city (Bombay)
→ per capita milk availability drop, genetic drain of cattle breeds, environmental & animal health issues

In 1965, Verghese was asked to set up the National Dairy Development Board, essentially the same as Amul but on a national scale. This project was dubbed 'Operation Flood'. Verghese served as founder chairman on the board for 33 years. The board itself was created to promote, finance and support producer-owned and controlled organisations, where the progammes initiated by the board aimed at strengthening farmer cooperatives and to aid in growing the institution.

The Anand model → AMUL (history)

→ Polsons - a private dairy at Anand (location) - procured milk from milk producers through middlemen, processed it and then sent the milk to Bombay, some 425 km away
→ Producers striked in Anand (1946) → formed "Kaira District Cooperative Milk Producers' Union" → today "AMUL"
→ basics of cooperative: milk producers market their milk collectively; open to all; decisions: one vote per person; continuing education of its members, elected leaders and employees

"Operation flood"

- dairy surpluses in Europe → a threat to Indian dairy production?
- Kuriens plan:
  1. Use food aid (milk powder) from Europe to generate demand for milk products
  2. When demand generated: copy Anand model + trade restrictions (national market protection)

  → cooperatives at village level

  → create physical and institutional infrastructure for milk procurement, processing, marketing and production

  → link cooperatives with big cities (consumers)

  → high import duties, non-tariff barriers, restrictions on imports and exports
- → 13,000 cooperatives in 1981; 34,500 cooperatives in 1985, 73,000 cooperatives in 1996
- Results:

  →increase in income, employment, production, availability,

  → increase in demand

  → from importing country to biggest producer of dairy products

  → milk producers get a major share of the income

  → national milk grid linking producers with consumers in over 700 towns and cities

  → reducing seasonal and regional price variations

  → 165,4 million t in 2016-17

Verghese Kurien passed away on 9 September 2012, at 90 years of age, in Anand. Throughout his career, he was honoured with multiple accolades and awards from India and, also worldwide (a list can be found on his website (www.drkurien.com).

Cattle Industry in India Today

As per the 2012 census, there are 88 million in-milk animals, however the total number of cattle equates to 300 million. This means that there are numerous unproductive bovines, including 84 million males that are essentially only of cultural interest, but cannot be removed due to the beliefs of the people in the cow being a holy creature. There is currently also rather poor record keeping, as this has not yet been prioritised, however, the use of modern technologies such as sperm sexing is of interest and used, to increase the number of heifers of high genetic merit. Biodiversity continues to be an issue, as western breeds are of interest due to their higher reported milk production. Even though many of the indigenous breeds have a better adaptability, disease-resistance and feed-efficiency, these indigenous breeds are declining. There is interest in the preservation of these breeds, with an initiative to the establishment of a national bovine genomics centre for indigenous breeds.

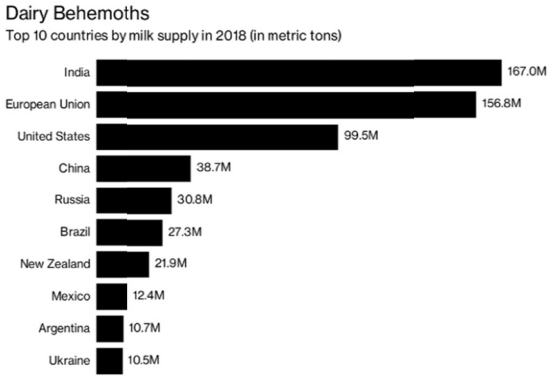

Figure 2 Worldwide milk production (Source: USDA Foreign Agriculture Service)

India is currently the largest producer of milk worldwide with 176.4 million tons, from the total 811.9 million tons worldwide (2017-2018).

Most of this milk is produced by animals reared by small, marginal farmers and landless laborers; 23% of agricultural households with very small parcels of land reported livestock as their primary source of income, as households with some cattle are better able to withstand stress related to extreme environmental weather conditions.

The milk availability in India is currently at 374 g per capita and day, where the world average is 294 g. This value has tripled since 1950, the beginning of Kurien's involvement, when it was only 130 g per day (Cattle and Dairy Development), resulting in milk having become an extremely substantial animal protein source for many Indians.

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THE HINDU NATIONALISM AND ITS IMPACT ON NON-HINDU LIVESTOCK FARMERS

by Aino Berg & Marilena Reinhard-Kolempas

What is Hindu Nationalism?

It is an ideological movement influenced by a diversity of thinkers, writers and politicians. The movement aims at promoting *Hindutva* - Hinduness - at social, cultural and political level, so it is a very well-organized movement.

The ideology of Hindu Nationalism equates India´s national identity with Hindu identity, the nation of India with a Hindu Nation and defines Indian culture as Hindu culture, where minorities should assimilate themselves.

Ram Mohan Roy (1772-1833, Brahmin caste): Reformist and "Father of Indian Renaissance"
S. D. Saraswati (1824–1883, Brahmin caste): Revivalist promoting the idea of an egalitarian "Aryan" society in Vedic times (1500-500 B.C.)
V. D. Savarkar (1883–1966, Brahmin caste): Formed the term "Hindutva" and led *Hindu Mahasabha* into opposition to the Indian National Congress
N. V. Godse (1910-1949, Brahmin caste): assassin of Mahatma Ghandi
M. S. Golwalkar (1906-1973, Brahmin caste): Former leader of the *RSS*

Box 1: Selection of ideologues and activist influencing the Hindu Nationalist Movement

How did it start and how did it evolve?

Hindu Nationalism has its roots in 19th century, when it was firstly expressed as a reaction to British domination. The local academic elite was fascinated by scientific, technological and political achievements brought by the British (e.g. railway system, central administration) and saw the necessity to reform aspects of Hindu tradition (e.g. child marriage, sati). But many of them regarded Western influence as a threat and were, in fact, trying to make Hindu society acceptable to the West in order to protect it. Reformists became revivalists searching for evidence of the spiritual, cultural and social glory of Indian antiquity ("Vedic Golden Age").

Later in the 20th century the focus moved towards the Muslim minority as the "threatening other" (socioeconomic conflicts, pro-Muslim bias of British administration, rise of the pan-Islamic movement). Reformists and orthodox Hindus united in the *Hindu Mahasabha* (1915), firstly working as a sub-organization of the congress. Reformists were dominating until the differences became too strong. Hindu nationalists disagreed with the universalist and secularist concept of an Indian nation represented by the Congress and they opposed the partition of India. This led to a separation from the Congress in 1930 and to a more aggressive political work.

Who are the key actors today?

The *Sangh Parivar* (The Family of Organizations)	
Bharatiya Janata* Party *BJP Political party leading the government coalition; since 2014 under PM Narendra Modi	***Rashtriya Svayam-Sevak Sangh*** Cultural association organizing grassroots activities (*sakhas* - branches) and training camps

Box 2: Key Actors of the Hindu Nationalist Movement today

How is Hindu Nationalism affecting non-Hindu livestock farmers?

"People who slaughter cows, who slaughter animals, are destroying our rivers of milk" – Narendra Modi

The victories of the *BJP* in 2014 on national level and in five states in 2017 emboldened right-wing Hindu activists and negatively affected Muslim livelihoods and lives. Since the *BJP* came to power, an increase of attacks against cattle traders and beef consumers by Hindu vigilante cow protection groups has been reported, some of them ending lethally.

The *BJP*-led states extended the cow slaughter bans to include also unproductive cows. Claiming that rising meat and leather exports would destroy the local cattle population, they also banned interstate cattle transports for slaughter and introduced higher penalties (the Supreme Court has now suspended the transport ban). Especially after the victory of the *BJP* candidate and monk Yogi Adityanath in Uttar Pradesh, dozens of slaughterhouses and over 50,000 meat shops were closed, some butchers were unlicensed. Traders face rigid controls and high bribes by police officers. In *BJP*-ruled states there has been an increase by 50% of cows held in cattle shelters, *gaushalas.* These shelters receive abandoned cattle as well as animals taken away from their Muslim owners by cow protection groups. Cows are then often sold to Hindu farmers and households. These policies are seen as an attempt to marginalize Muslims and to squeeze them out of the beef and leather industry, employing millions of Indians. Beef and leather exports dropped by 15%, leading to unemployment of many people and to limited access to red meat. Red meat however, being a cheap source of protein, is a staple in the Muslim communities as well as in the lower castes' diets.

- Symbolic mother of all Hindus Gau Mata (female purity & docility)
- Yields food without being killed
- Gives so much without asking anything in return
- Important pillar of rural economy: Nutritious milk, dung for fuel and fertilizer, essential partner
- "A matter of status" – higher castes do not consume beef or meat in general

Box 3: Holy Cow! Why is the cow so important in Hinduism?

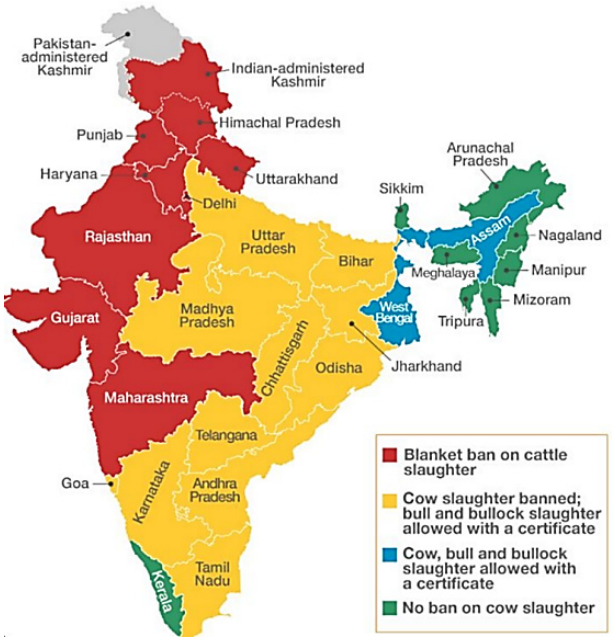

Figure 1: India´s cattle slaughter laws. Some states have completely banned cattle slaughter, while others allow it with a "fit-to-slaughter" certificate, issued when an animal is unfit for breeding, milking or work purposes.
Source: Aljazeera.com

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VEGETARIANISM, VEGANISM AND TRADITIONALISM
THE INDIAN MIDDLE CLASS AND THE REVIVAL OF FOOD CULTURES

by Karoline Kröner & Sophia Hesse

India is well known for its traditional cuisine, for its various spices, its diverse curries and tasteful combinations of colorful vegetables. Since India is a tremendous country with various climatic, religious, cultural, regional and geographical differences, the eating habits differ from region to region. In North India, meat dishes are more common. These dishes are often combined with ghee or yogurt and served with rice. Since they are less spicy, they got quite popular in the western culture. In East India more sweets and desserts can be found, and the main staple food in this region include rice, freshwater fish, vegetables and coconut. On the grounds of its close proximity to the Arabian Sea, fish and shellfish dishes are very common in Western India and the dishes are often combined with sorghum. In the South, spicy and meals with vegetables are popular. Most dishes also include coconuts and rice [1].

Regardless of regional differences, vegetarianism plays an important role all over the Indian subcontinent. “Vegetarianism” can be defined as excluding meat, fish, seafood and possibly other animal products such as dairy and eggs from the diet. Vegetarianism encompasses a spectrum of eating patterns: from diets that leave out all animal meats and products (vegan) to diets that include milk and milk products but exclude the consumption of eggs (lactovegetarian) [2].

The majority of Indians are vegetarians in adherence to their culture and mainly driven by the conformity to social norms. Over 80% of India´s population feel dedicated to the Hindu religion that strongly recommends non-violence against all forms of living beings including animals (ahimsa). Beyond that, the Hindu belief in reincarnation and the conviction that a non-vegetarian diet is detrimental for the mind and spiritual development reflect the close connection between vegetarianism and this religion. Apart from Hinduism, there are 0.4% Indians belonging to Jainism, a religion where vegetarianism is mandatory for everybody based on the principle of ahimsa. Going even further, this religion encourages to avoid everything that involves uprooting a plant to obtain foods, e.g. potatoes or garlic. The ranking of castes, a social stratification mainly influenced by Hinduism, is following certain eating habits: belonging to a higher caste requires the purity of the diet including a strict vegetarianism, whose violation can have immoral or dangerous overtones. In recent years, the influence of castes has declined and several laws try to overcome the barriers resulting from the strict caste system in India [3] [4].

Besides the association with tradition, power and status, there are also Indians being vegetarians as part of a conscious ethical choice. Namely, there is Mahatma Ghandi, whose vegetarianism was based on a moral basis and was reflecting his commitment to non-violence, exemplifying that the same outcome is not necessarily resulting from the same progress of thought [5].

All in all, there are 20-40% vegetarians in India, depending on the literature [6] [7] [8]. However, Indians are suspected to underreport their meat consumption due to religious and cultural stigmas associated with it [2]. In comparison, in Germany there are 10% vegetarians [9]. To get a better impression of the different amount of meat consumption in these countries, it makes sense to compare the annual per capita consumption of meat. In Germany a person consumes around 60 kg meat per year, whereas Indians only consume around 5 kg. However, it is important to mention that the meat consumption in India has more than doubled in the last 10 years. One reason is the fast-growing Indian middle class, which models their new consumer lifestyle on the West, and as a result, vegetarianism is reducing popularity [10] [11].

The Indian middle class was a minority in the post-independence period and characterized by the belief in a “traditional lifestyle”. This included homemade meals cooked from scratch every day, a close link to the family and to a form of communality, and a more restrained and domestic way of living. Even if there already was an establishment of a non-vegetarian diet by eating out, vegetarianism and traditional dishes were common. The strong linkage of food- home- woman was one of the crucial markers of middle-classness before the 1990s.

With the opening of the economy and fundamental reforms of the country´s economic policies, the middleclass started to immensely expand after the liberalization in 1991, followed by a deep mental change in the Indian society. Nowadays, more than 300 Million Indians are being regarded as part of the Indian middleclass. This strong middleclass was the prime target of new products and services, and the promotion of foreign dishes (pizza, pasta, specific meat preparations), western-style pre-processed food and labor-saving devices such as mixer, new cookers and microwaves led to a modernized consumption culture. Moreover, eating out in the westernized fast food restaurants became quite popular, and is mainly based on status reasons and a feeling of richness and coolness. Especially among the young generation it becomes quite popular to have a non-vegetarian diet. This trend is contradictory with the young generation in Germany, where eating vegetarian dishes becomes more and more common. Both reactions emerge from a rebellious position against traditions and the system in general. This trend leads to a destruction of earlier forms of communality and sociality, e.g. the parent- child bond, and are followed by an increasing tension between traditional ways of being and modern ways of consuming in the society [12] [13].

There are different efforts and trends to revive tribal and traditional cuisine, since more and more people are in the balancing act between career and tradition due to the growing middleclass and since westernized food starts to replace the traditional food. On example are the *Dabawallas*. They are the best organized Delivery Service worldwide and are located in Mumbai. They deliver the homemade food to the laboring man [14]. People also organize food festivals; thus, local people feel proud again about their food culture [15].

[16] Dabawallas in action

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Day Protocols

Kochi to St. George

by Corinna Geyer & Svenja Hemgesberg • 2nd of March 2019

It took two long flights with a pit stop in Bahrain to catapult us from the cold German weather to more cozy temperatures – we finally arrived in India, Cochin to be specific. Unfortunately, we were tremendously incomplete since most of the group were stuck in Mumbai after a flight had been canceled. However, waiting was no use, so after meeting the Indian colleagues at the airport we moved towards the hotel for breakfast and an opportunity to freshen up. The day was still ahead of us.

Diving right into the busy streets, we started our day in Kerala's most visited city. A quick trip with the ferry brought us to the Mattancherry peninsula – the old historic center of Cochin. The contorted streets, many churches, temples, palaces and the old Jew Town are what make it attractive for many tourists.

The city's material wealth is based on the successful use of spice routes and trading operations with the many spices that were and still are cultivated upstate. It quickly became the most important harbor at the Malabar coast. Cochins ethnic and cultural prosperities result from the colonial powers and their greed to take the lion's share of the city's wealth.

The Jewish Town – which was provided to the Jews as an exile by the Raja to protect them from encroachments by the Portuguese – is to this day characterized by what it used to be famous for. Hundreds of years ago, we would have found ourselves in the hub of spice trade that made the city and its leaders rich. Today

there are still many stores and small cafes. Especially along **Jew Street** (*above*) you will find many art and antiques shops.

This area is indicative of what it used to be although now the relicts are more of a tourist attraction than of economic relevance. Nowadays people from the south (Kerala) often find work overseas and are able to finance the lives of their families in their hometown.

St. Francis church (*next side*) was our next big stop. As the first European church to be built in India within the oldest European settlement of fort Cochin it was a must-see. It presumably owes its origin to the Franciscan friars who accompanied the Portuguese expedition in A.D. 1500. Originally, it is said to have been erected of wood but later rebuilt in stone and roofed with tiles 16 years later. After the

Portuguese, it has been in the possession of the Dutch even after the British Control over Cochin until it was surrendered to the Anglican Communion in A.D. 1804. At present, it has been taken over by the church of India.

The most interesting fact though, is without doubt that the first European Navigator from Portugal to India, Vasco da Gama, was laid to rest here in A.D 1524 during his 3rd visit to India. Da Gama was the first to link Europe and Asia by sea and therefore a key figure in connecting the West and the Orient. His discovery fired the starting pistol for the Portuguese to establish a long-lasting colonial empire in Asia as well as a tremendous economy boost due to unopposed access to the Indian spice routes (until 100 years later their monopoly and naval supremacy in the Cape Route was challenged by other European Powers). His body was originally buried in this church but after fourteen years, his remains were removed to Lisbon.

After a fresh coconut snack, we went to scout the north shore. Functioning as a landmark and tourist attraction rather than bringing high income are the Chinese fishing nets ("shore operated lift nets"). The local fishermen showed us how they operate the construction which is commonly found throughout coastal southern China and Indochina rather than India. This unique way of fishing, locally known as 'Cheenavala' was brought to the people through Chinese explorers in the 14th century. One interpretation of the city name Kochi is 'co-chin', meaning 'like China'.

During monsoon season, the revenue is said to be quite good but apart from that, the profits from fishing are rather sobering.

While the sun was about to set we made our way back to the hotel after a long first day with many new impressions. However, this was just the start…

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Kochi to St. George - Afternoon session

by Jana M. Bauer • 2nd of March 2019

The following protocol covers the afternoon hours of our first day in India, the 2nd of March. After having had visited the Cochin Harbour, a Church, and a small farm on the way, we continued towards Periyar Nationalpark. During this journey several further stops were made where we got to know more about Fish farming, Rubber production, and a NGO that works in Organic Agriculture. Below, an overview over the knowledge we gained during these stops shall be given.

Rubber

Socio-economic implications: Rubber plantations could be seen all along our way. Nevertheless, most plantations were not in constant use. This has economic reasons both concerning market and input prices. Due to intensive investment in rubber production by China over the last years, markets saturated, and prices decreased tremendously. Being a labor intense farming operation, serious input challenges are faced in Kerala due to out-migration, resulting labour scarcity and hence high labour costs. This has led to a change in strategy by most rubber farmers. Having the plantation still in place to be used in times of better prices, other farm businesses are focused on.

Prof. Bürkert explaining how rubber is harvested

Production: Apart from a Xylem and Phloem, rubber trees further have a latex layer that seals the bark surface in case of wounding. For harvesting purposes the bark is cut every 3-4 days and treated with acetic acids in order to avoid coagulation. In a later factory process, sulfide acid is used to control coagulation for sedimentation, which is crucial in the process of volcanisation.

Fish.ly Fish Farm

Background: We visited an intensively managed fish farm owned by a hardware business man who inherited the property. Having inherited the land with rubber plantations, he established fish ponds due to the above explained price decline. The business man now owns two 50x50x2m³ fish ponds with ca. 20 000 GIFT (Genetically Improved Farm Tilapia), which are managed with the support of a consultant.

The system: Due to the high stock rate, the so-called BIOFLOC system is in place. Every two months a new stock of fish is established, whereby the young fish (5-10 g in weight) is delivered from the state hatchery in Andrapradesh, and delivered to Cochin by plane. All fish are male in order to avoid reproduction, and due to a higher growth rate compared to female fish. The fish is fed with “GROWFIN-nutrition for fish” by the company Growel. For more information see [4].

Marketing: The fish is marketed in retail, at times to catering companies, and partly directly (around 100 kg). From a weight of 5-10 g the breed develops to 500 g-fish within six months. Per kg fish, the farmer can then earn 260 Rs.

View down on the ponds of FISH.LY fish farm

Additional Information of Aquaculture

Genetically Improved Farmed Tilapia (GIFT): The WorldFish organization ran a breeding program for genetic improvement of farmed Nile Tilapia (*Oreochromis niloticus*) from 1988-1997. The aim was to develop a faster-growing strain that was suitable for both small-scale and commercial aquaculture in response to inadequate supply of tilapia seed and the deteriorating performance of the fish in many aquaculture systems in Asia. The founding population comprised wild and farmed Nile tilapia from both African and Asian countries. The breed has been disseminated to 16 countries, of which one is India. [1]

Biofloc Systems

Biofloc systems are recirculating aquaculture systems. The technology is used in intensively managed systems with limited or no water exchange under a high stocking density, intense aeration and biota formed by bioflocs. Through the establishment of microbial communities, excess nutrients from uneaten feed and excreted metabolic waste are cycled through assimilation. Unlike in other recirculating systems, resulting particulate matter is not removed through external filtration but allowed inside the cultivation where it serves as nutrition for the aquatic animal. [2,3]

Peermade Development Society (PDS)

Background: In the evening, we arrived at PDS, where we got an introduction to the organization in form of a slide show and discussion.

Programmes related to Agriculture: Among its programmes, PDS is devoted to increasing farmers´ welfare by promoting organic agriculture. The organization is the largest NGO in South India both in terms of its 600 staff members and in its number of programs. PDS runs a research institute, two colleges, a school of social work and a MBA. It has several business associations to Germany and Austria, and is certified organic through a Dutch agency. It is furthermore the largest exporter of spices in the region, of which 60% are shipped to the US and 40% to Europe.

It therefore sees the farmer in the centre of its interventions, promoting NRM (Natural resource management) activities, bio-fertilizers, quality seeds, value addition, export and income generation, and accordingly 100% support in organic certification by covering the total certification costs for farmers.

By exporting organic products, PDS is able to sustain itself. The self-sufficiency strategy is further built on by offering Ayurvedic retreats for tourists.

PDS is a member of the National Innovation Foundation, which awards innovation makers who do not have a college degree. A concept acknowledging further "informal"* expertise is the concept of LAND TO LAB; LAB TO LAND. Through this concept local and traditional knowledge from the fields (LAND) is used to develop improved technologies in the LAB. The advanced methods are then taken back to the farmers and applied on the LAND.

About PDS

"Established in the year 1980, PDS aims at the sustainable development of the tribal, rural poor, marginal farmers, women and children through developing various indigenous, community based and people participatory developmental programmes. PDS is identified as one of the largest NGO of South India." [5]

PDS was started in a village called Peermade with the aim of community development. As a catholic organization, its VISION is derived from a verse in the Bible: *"… that they may have life and have it abundantly."* (John 10:10)

Peermade Development Society (PDS)
NON - GOVERNMENTAL ORGANIZATION (NGO)

For further information about PDS visit http://pdspeermade.com/.

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Arriving in India - First Impressions from Kochi

by Li Kathrin Kaja Rupieper • 3rd of March 2019

After a missed connection flight and a full day spent in Mumbai's airport, we finally arrived at our destination, Kochi. The port city is located on the southwest coast of Kerala and is also called "Cochin". Kochi used to be an important trade center: Arabic Jews settled in this area around 200 to 300 BC and established the trade with spices. Their influence can still be recognized in the city's architecture as a synagogue and the old harbor still remain. Both became popular monuments - even though today's Jewish community is very small to non-existent. But there is more to say about Kochi's relevance as historic trade city: after Vasco da Gama's 'discovery' of the cape of good hope, Portuguese seafarer established a spice trade route with India. In addition, the first Portuguese settlements were founded in 1500 in the Kochi area. Later on, the Dutch and the British also left their marks on the city.

Even today, Kochi still profits a lot from its harbor. Therefore, we started into the first day of our excursion with a boat trip. Sitting on a wooden bark and well protected from the rising sun, we drove by the new harbor with its numberless containers waiting for their journeys around the globe, piers full of traditional barks in front of giant billboards advertising more modern vehicles or real estate projects, a luxury hotel resort that used to be a palace back in the days, and the facilities of a fertilizer plant. For some time, our ship was even accompanied by Indian Ocean Humpback dolphins (Sousa Plumbea). Furthermore, we observed various fishing activities:

- Individual people on the shore throwing small nets in the water.
- Fish trawler.
- Fishing cranes.

Fishing cranes are made out of strong wooden branches. Their net is held down by the weight of stones and the whole construction is then repeatedly lifted up and down (by manpower only). Normally, a patron owns such an installation and needs to hire around 5 workers for its usage. Typically, men do this job. In the area of Kochi, there is no season in fishing but monsoon might restrict the fishing activity. At this very day, the individual fishermen on the shore seemed to make bigger earnings than the fisher cranes.

Traditional fishing cranes on the shore in Kochi

After the boat trip, we went on by bus towards the hinterlands of Kochi. We visited the Mar Augusthinose College in Ramapuran where one of our supporters, Prem Vazhacharickal, works. At this college, students can achieve bachelor degrees in natural sciences, computer sciences, business, English, Hindi, and Malayalam (which is the state's language). The semester fees are around 100€ but some courses are more expensive than others. The college was established in 1995 by the St. Augustine's Forane Church that still greatly supports the college. As we came on a Sunday, we did not observe any typical college activities. But as the St. Augustine's Forane Church is located just across the street, we saw a huge crowd of people streaming out of the Sunday Mass held in a big and just recently constructed edifice. Since the church also takes care of orphans, there were especially many children coming out of church. We heard the soon-to-be famous "picture, please?" for the very first time and took some selfies with the very nice and polite church visitors.

St. Augustine's Forane Church in Ramapuram (Kerala)

Children came asking our names, testing their school English. What definitely should be mentioned are the beautiful Sunday dresses that everyone had put on, even the youngest. After the mess, some women gathered under a roof nearby sitting on plastic chairs, waiting for some additional Sunday school or training. We also visited a small museum on the church ground.

Then, Prem showed us a small farm of a friend of his. It was located in the typical green hills of Kerala, in the middle of rubber plantations. The main activity was quail breeding. The quails lived in separate age groups. The youngest chickens were brought up on the roof of the family's house where gas lamps ensured a constant temperature. Older chickens were held in other fenced-in-areas on the house's roof and the grown ones were kept in a henhouse behind the house. During a break, we had the chance of trying boiled quail eggs as well as a number of other delicious snacks. The rest of the farm was organized as a forest garden. There was banana, mango, jackfruit, pepper, coconut, various herbs and plants of medical value…

The family also kept wild, stingless bees. Even without a sting, these bees are able of defending themselves – in that case, guard bees bite the invader and go into that person's hair, mouth, ears and eyes. Thanks to their small size, these bees can also access medicinal plants. This makes their honey very valuable: Its selling price is around 2000 Rs per kilo. But as one box yields only around 400 g per year, the bee keeping as well as the growing of fruits and spices only offers an additional income to the quail breeding.

Flora of the Periyar National Park

by Charlotte Junker • 3rd of March 2019

Background information

The Periyar National Park is situated in the eastern part of Kerala near the border to Tamilnadu and covers an area of 952 km^2. Since 1982 the inner core zone, covering 305 km2, has been declared as national park. In the whole park area, altitude ranges between 900-2000 m a.s.l. In the eastern part the park includes the Cardamom Hills and in the south, the Pandalam Hills of the Western Ghats Mountain range (AUGUSTINE, 2000). Climate varies along with the altitude, showing monsoon climate (Am) with heavier rainfalls in the lower areas nearer to the coast and savannah climate (Aw) in the higher areas. In both climate zones, a hot and dry summer period occurs from February to May, a colder winter period from December to January and two Monsoon periods, the southwest monsoon between June and September with very high rainfalls and the northeast monsoon from October to November (ILLIES AND MANI, 1974).

The following vegetation types can be found in the national park (ANCF, 2010):

1. Open grasslands on numerous small steep hills, studded with fire-resistant vegetation
2. Deciduous forest dominated by *Terminalia*-species and teak (*Tectona grandis*)
3. Semi-evergreen forest, mostly along rivers
4. Evergreen forest, mostly in valleys

Further, about 1966 flowering species, 171 grass species and 140 species of orchids have been identified so far. In addition, more than 350 medical plants have been discovered. Many of those varieties are endemic and threatened (AUGUSTINE, 2000).
When looking at the present vegetation, anthropogenic influences must be considered: the areas surrounding the core zone have been deforested and are nowadays intensively used for agricultural production (especially for coffee, tea and spices). Further, in 1895 the Mullaperiyar Dam was constructed to facilitate rice-cultivation in the regions of Tamilnadu. By flooding several valleys a large lake was created.

Description of the day trip

The day started early with a boat trip over the Periyar Lake. As we visited the area during drought season, it was interesting to see as what a semi-evergreen (or semi-deciduous forest) looks like in the dry season. Semi-evergreen forest can be found in areas where a strong, regular annual dry period occurs (longer than three months). They appear as close, tall forests, with deciduous trees in the top of the canopy, whereas in the lower layer also evergreen trees occur. The stature is usually lower than of evergreen rainforests (ROBERTS 2019). During the boat trip the two layers could clearly be distinguished. Afterwards we had a nice breakfast, testing different variations of dosa (a type of pancake or crêpe).

Semi-evergreen rainforest in dry-season along the Periyar Lake

At early midday we started a jeep-tour to the hilly areas outside the core area of the National park. As we went along a river, vegetation differed notably from the very dry surrounding. As along this river water availability was not restricted to seasonality, an azonal ecosystem looking like a corridor along the river, a so-called gallery forest, had developed. When driving further we saw deforested, eroded steep hills, where lemon grass was cultivated.

Deforested hills and lemon grass cultivation

Afterwards we stopped at a small but interesting agroforest system, where cacao, coffee and cardamom were cultivated. We learned that Ricinus (*Ricinus communis*) was planted in between the plantations, which works as an insecticide. Next, we saw huge tea-plantations. At our last stop we visited an ayurvedic spice garden. Here we were taught about the different health benefits of Indian spices.

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Agroforestry in India

by Ieva Bebre • 4th of March 2019

Agroforestry has high land-use potential in India. Currently, it is estimated that 13.5 mil. ha of land is used for agroforestry. Agroforestry systems are known for their carbon sequestration potential and positive impact on soil quality and restoration - it protects soil water resources and combats erosion. Apart from that, there is a number of tangible benefits that have a direct, positive impact on the livelihood sustenance, e.g., provision of food, fodder, fuelwood, and timber.

During our visit to India, we saw interesting examples of agroforestry systems like:

- Cultivation of tea under a shelterwood system in *Sapoi* tea estate,
- Cultivation of *Arabica* and *Robusta* coffee plants under a shelterwood system,
- Rubber tree plantations,
- Alley cropping – growing single trees on the side and using them for looping.

Hereinafter I will focus on the Sapoi tree farm and main reasons why they find shelterwood so crucial and the rubber plantations.

Sapoi tea estate and shelterwood system

Sapoi tea estate uses different tree species as a shelterwood for the tea plants. Some of the most popular are silver oak, neem, and acacia. Trees are used in a shelterwood system or as an intercrop and can serve for multiple purposes. In the case of neem, it is a natural insecticide thus helping to keep the tea plants healthy either by just their presence or by using the leaves to prepare an insecticide. Another desirable quality of shelterwood species is the ability to fix nitrogen.

Some of the most important properties of the shelterwood are:

- Protecting the soil from erosion;
- Providing extra source of nutrients from the fallen leaves as well as a mulching effect that helps with the weeds;
- Pulling nitrogen from deeper soil layers; in case of leguminous trees also fixing nitrogen in the soil;
- Providing shade (especially important during the hot period when tea leaves can get sunburned and cannot be used afterward);
- Creating a better microclimate under the canopy by alternating temperature and keeping soil moister;
- Providing an extra source of fodder and firewood when pruned.

Tea plantation with silver oak shelter trees

The potential of the shelterwood to affect the microclimate and temperature is also very important for the photosynthetic processes. For the tea plants, the optimal temperature for photosynthesis is 30^0C. During the hot summers and without shade the leaf temperature would be well above the optimum thus influencing tea yields.

When talking about possibilities to use agroforestry systems in tea plantations, it does not have to stop at trees and tea plants. According to the owner of *Sapoi* tea estate, there are still some possibilities to add extra crops, e.g., tree climbing plants like pepper. Diversifying production is a good risk management strategy that can potentially provide extra income.

Tea plantation with a draining system

Rubber plantations

Rubber plantations can be either established as monocultures or planted in degraded (< 10 % canopy cover) or open (10-40 % canopy cover) forests. There is a wide public discourse about the negative environmental impact of the plantations but still it is estimated that India has ca. 700 thousand ha of rubber plantations.

One can start harvesting rubber when the plant has reached 5-7 years of age and the harvesting can continue for approx. 25 years. It is technically possible to harvest the rubber for longer but the yields drop significantly and the plantation is nowhere profitable anymore.

Rubber tree timber is not high quality and therefore do not provide much revenue. The timber is mainly used for packaging and as firewood. Nevertheless, there have been attempts to do more with the timber, e.g. finger jointing and plywood production. If these processing technologies develop and the price of timber increases, it would be a great extra income for rubber farmers since currently the low rubber prices and high labor costs are a burden to rubber farmers in India.

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Holy Cow! - A visit to Bangalore's milking animals

by Imke Hellwig • 6th of March 2019

As our UBER-drivers drop us in the narrow streets of Shivaji Nagar, the sun is already blazing from a blue sky. We sit down by the roadside to wait for everyone's arrival and watch three cows passing by with their herder. Decorated all over with horns painted red, they quietly make their way down the hot pavement. Cows are considered sacred in Hinduism and thus able to walk through the crowded traffic completely unworried. In most parts of India slaughter is prohibited and killing one of these animals can lead to a maximum sentence of life imprisonment. Nearby, another cow wades through a pile of rubbish, carefully checking for edible items.

A cow moving down the road with her proud owner

Today, our group is guided into one of the city's milking farms. The grounds used to be a rural village's agricultural land, before the rapidly growing city absorbed the area and turned it into a district. We are welcomed by one of the small farmers, who proudly shows us his two cows. The animals are stabled in boxes around an inner yard, where they are milked by hand twice a day. Other than in rural areas, the milk is sold directly to the consumer, earning the farmer a decent cash income of about 30 INR per liter.

The 300 cows in this cluster, hold by 200 owners, are of different breeds. While cross-bred and exotic breeds, such as Holstein Frisian, have an average milk yield of 6-7 litres per day, indigenous cows' performance is much lower at 2-3 litres. Still, in terms of the total number of milking animals, native breeds are prevalent. In recent times, there has been a push for the so called A2 milk. Although there is no scientific proof for possible health benefits caused by the specific protein composition, India's government is taking steps to conserve native breeds, which are of the A2 milk type. By improving breeding programmes, farm management and animal health, the conservation of genetic resources could be achieved along with an increased production. Problems occur when farmers are not being compensated for the yield gap they experience by milking indigenous cows instead of higher-yielding bovine.

In some boxes, rubber mats are covering the hard granite floor

Since Bangalore is located on a granite plateau, this material is easy to access and thus used for major parts of the facility. We are surprised about the cleanliness and learn that it comes at a price. In a region constantly under water scarcity, large amounts of groundwater are used to rinse the floor und cool the cows down. Manure is washed away with the waste water, which then directly flows into rivers and lakes. The cycle of pollution closes as green fodder is brought in from contaminated lakesides.

Dung cakes to be sold (partly via Amazon) as a fertilizer for urban or for religious purpose

Not only is the fodder of poor quality, problems also emerge due to the high farming intensity and the lack of close-by grassland. Further issues, like food safety and animal welfare have to be discussed.

Like most things in India, our invitation to another nearby stable is spontaneous. About ten cows stand in a narrow shed. Their owner is confident to tell us that his stable is build right above a drain and therefore easy to be kept clean. According to him, his bull serves about five cows a year coming from outside. Added to that, he sells dung cakes his mother bakes for religious purpose at a price of 5 INR/piece on Amazon. Despite his various sources of income, he is concerned given the lack of support by the Indian government. His children should not continue with dairy farming, but rather look for a job in the service sector, he states.

On-station experiments of FOR2432/1 at University of Agricultural Sciences, Bangalore

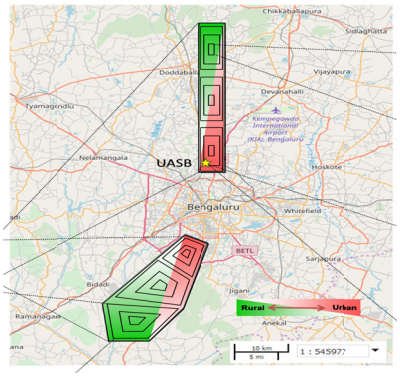
by Renuka Suddapuli Hewage • 7th of March 2019

What is FOR2432?

FOR2432 is a collaborative project of Germany and India that will address agricultural transition processes in the rural-urban interface of the emerging megacity Bangalore, India. The funding sources of the project are the German Research Foundation (DFG) for the German side, and the Department of Biotechnology (DBT) for the Indian partners. In Germany, the partner universities are Universität Kassel and Georg-August-Universität Göttingen, and University of Agricultural Sciences, Bangalore (UASB) is the main partner in India together with many other Indian institutions: National Institute of Animal Nutrition and Physiology (NIANP), Bangalore, Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, Institute of Socio-Economic Change (ISEC), Bangalore, Indian Institute of Space Science and Technology (IIST), Trivandrum, Institute of Wood Science and Technology (IWST), Bangalore, APU - Azim Premji University (APU), Bangalore (FOR2432, 2019a).

Where is the on-station experiment of FOR 2432?

FOR2432 is based in Bangalore, which is in its top stage as a blooming megacity in Karnataka state, Southern India. There are two transects showing the urban-rural dynamics of the megacity located north and south of the city center.

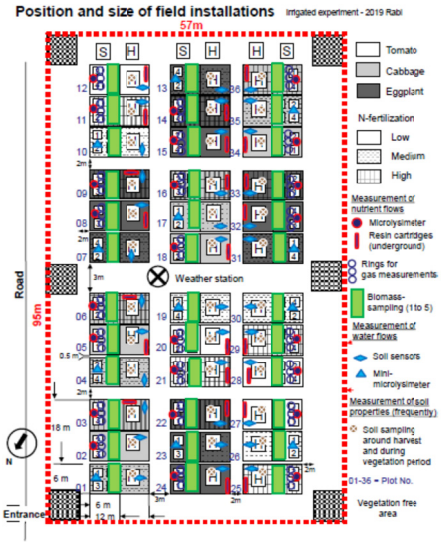


UASB and the spatial distribution of the two transects (Source FOR2342/1, 2015)

Along the transects, some selected farmers are conducting the on-farm experiments, and the UASB conducts the on-station experiments.

What are the experimental design and activities?

There are two on-station experiments at two different sites in the UASB premises: a drip irrigated experiment in the agroforestry land, and a rainfed experiment in the dry land. The irrigated experiment grows two crops per year: in the Rabi (dry) season with tomato, cabbage and eggplant under irrigation, and in the Kharif (wet) season with finger millet, maize and lablab under rainfed conditions, supplemented, if necessary, with life-saving irrigation.



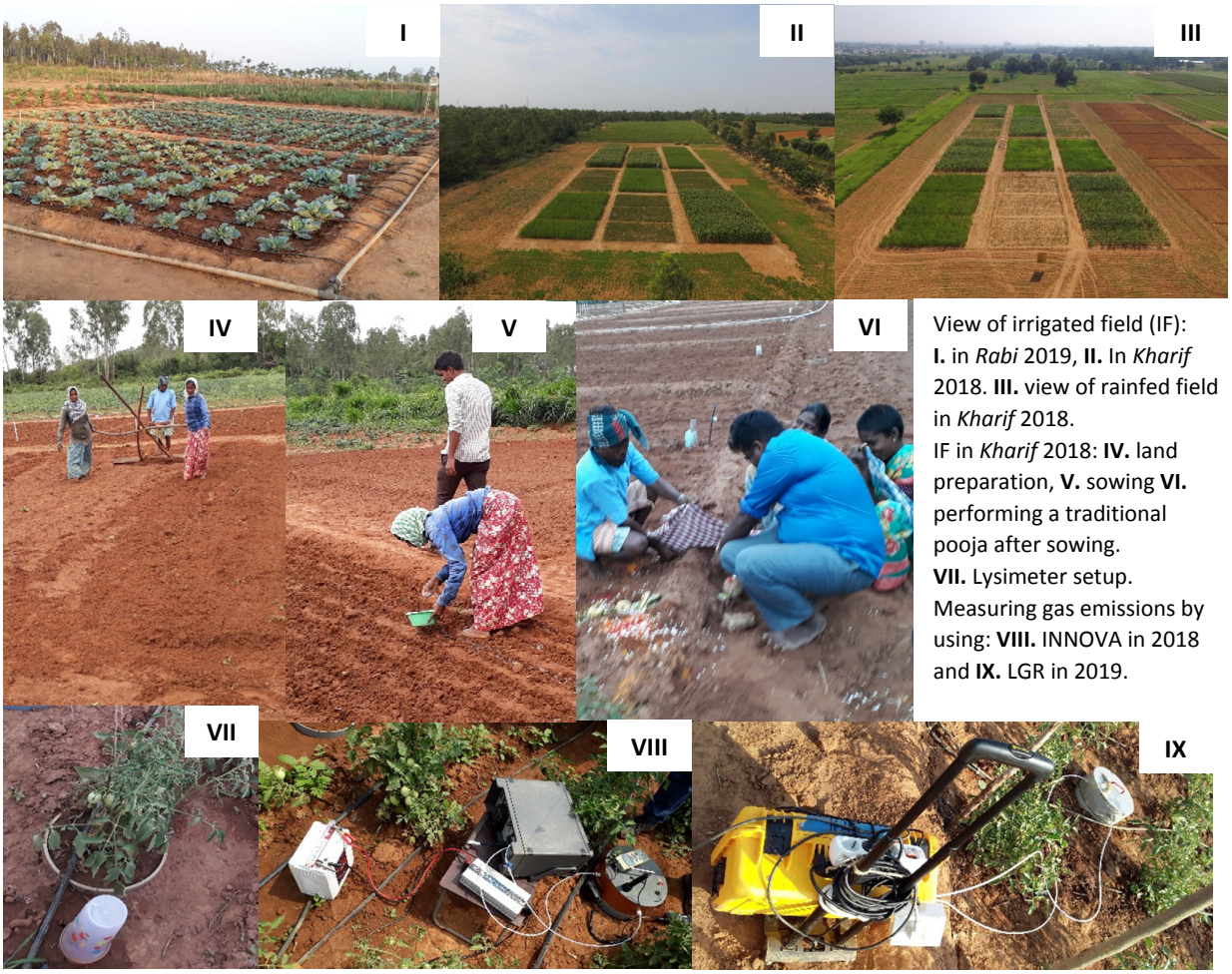
Details of the on-station experiment plot plan for Rabi 2019 season

The rainfed experiment only has one crop in the Kharif season with finger millet, maize and lablab. The experiments are based on factorial design with three different N-fertilizer levels (high, medium and low) with four replicates. The crop rotation takes place each season (Figure 2). Data is collected by the sub projects A01, A02, and C01 on plant growth, matter fluxes, and physical and chemical soil parameters.

What are the expected outcomes and the future of the experiments?

The expected major outcome of the on-station experiments is an in-depth knowledge of the effects of agricultural intensification on material flows in different cultivation systems. In addition, those experimental plots are used to calibrate the remote sensors, which will play a major role in agriculture in the near future.

The first phase of the on-station experiments will be finished with the ending of the current cropping season (after a total of six seasons from Kharif 2016 to Rabi 2019). The German partners already received the extension for the second phase of the project (FOR2432/2 from 2019 to 2022), so that the on-station experiments can go on as before for FOR2432/2 starting with the Kharif 2019 season.



View of irrigated field (IF): **I.** in *Rabi* 2019, **II.** In *Kharif* 2018. **III.** view of rainfed field in *Kharif* 2018.
IF in *Kharif* 2018: **IV.** land preparation, **V.** sowing **VI.** performing a traditional pooja after sowing.
VII. Lysimeter setup.
Measuring gas emissions by using: **VIII.** INNOVA in 2018 and **IX.** LGR in 2019.

Impressions from Gowdahalli Doddaballapura - Bengaluru urban-rural gradient

by Katharina Hemmler & Manuel Schuler • 7th of March 2019

On the sixth day of our study tour, we went to a village called Gowdahalli Doddaballapura in the peri-urban area of Bangalore. We were accompanied by Sunil Nautiyal, Professor and Head of the Centre for Ecological Economics and Natural Resources (CEENR) of the Institute for social and economic change (ISEC), focusing on natural resource management & conservation, land use land cover change analysis and sustainable livelihood development. Sunil chose this village, which he described as neither urban nor rural, because it depicts the rural-urban transition of Indian agriculture very well. On the way to the village, Sunil outlined that the transformation can be explained with an analogy of a deer and an anaconda where the deer (rural area) is killed and slowly eaten up by the anaconda (urban area). He gave us the example of the RMZ Galleria Mall in the district of Ambedkar Colony, Yelahanka, where he said, five years ago there was nothing. Therefore, the regions around Bangalore go through a transformation process from rural to peri-urban to urban areas. Thus, the land use transformation comes along with a change of agricultural practices, such as the increased production of flowers, tomatoes, grapes and silk to satisfy the needs of the growing metropole and its ten million inhabitants with changing lifestyles and increasing spending power.

Flower production:

India has a long and rich tradition of floriculture as flowers are embedded in many social and religious rituals such as home decoration, hair accessories and as offerings in places of worship. In recent years, the demand for flowers grew due to urbanization and changing life styles, particularly of the growing Indian middle class. On top of that, export to foreign countries like the US, Europe and the UAE increased. On Valentine's day for example, ten million roses were sold from Bangalore to Europe. Thus, floriculture became a lucrative source of income to many farmers, especially in the peri-urban region. According to Sunil, farmers earn approximately 100.000 rupees per hectare of flowers yearly. Despite high social and ecological costs, the floriculture industry in peri-urban Bangalore is blossoming.

Flower production near Gowdahalli Doddaballapura in the peri-urban area of Bangaluru

The state of Karnataka ranks first in the flower production in India with an increasing trend in area and flower production. In 2016, the area under flower cultivation was almost 32.000 hectares with an outcome of 230 thousand metric tons, which accounts for approximately 12% of the Indian floriculture area and production. Overall, floriculture is seen as a high growth industry with a promising future in Karnataka and whole India.

Tomato production:

Growing tomatoes is very common in the rural-urban area of Bangalore because it can be very lucrative. According to Sunil, if the farmer is lucky, he/she can earn up to 500.000 rupees per year. However, it is a very risky crop for two reasons. First, the prices are very fluctuating. According to Sunil, they range from 80-100 rupees/kg to 2 rupees /kg. Second, heavy rainfalls during the monsoon season can destroy the tomato crops. As a result, four out of five crops fail due to immense rainfall. For this reason, growing tomatoes is only possible if the farmer has an additional stable source of income in order to sustain the family (such as grape production or animal husbandry).

Tomato production near Gowdahalli Doddaballapura

Goat & Cow husbandry:

Goats are multi purpose animals, which can produce milk, meat, fiber and leather. For this reason, goat farming is a highly profitable business among peri-urban farmers in India. Furthermore, goats produce high quality manure, which can also be used as a fertilizer to increase the in-house crop production. Goat farming requires less space and less production costs compared to cow farming which makes it to an interesting alternative to cow farming. According to Sunil, 100 goats in the area of Gowdahalli Doddaballapura can bring an annual profit of 120 000 Indian Rupee (around 1500€).

Goat farming in Gowdahalli Doddaballapura

Usually cow farming is more common in India than goat farming. India is the second largest milk producing country in the world after the USA. In both, urban and rural area, cow breeding is mainly defined by two cow varieties. The local Gyr- and the European Holstein Friesian breed. Under the present circumstances the Holstein Friesian cow can produce 5-10 liter milk per day. In India the Holstein Friesian breed usually produces 30-40 liter milk per day under optimal conditions. Due to suboptimal temperature and fodder conditions, the milk yields are lower in peri-urban and rural areas. Compared to the foreign breed, the native breed is less productive. A yellow label at the cow's ear allows feedback on the subsidy by the government for both, domestic and foreign breeds.

Grape production:

Usually grapes are cultivated in sub- tropical regions. Thereby, India and its tropical climate provide excellent conditions for grape cultivation. For this reason, India is one of the world's leading countries in the production of grapes. The second largest producer state of grapes in India is Karnataka. It is well known for growing different varieties of grapes. Bangalore, the capital of the state, is famous for the local wine production. The high sugar grapes of Bangalore are often used for local "sula-wine". In the following the pros and cons of Bangalore's grape cultivation are listed:

Pros	Cons
Perfect weather conditions (dry and sunny)	Water intensive
Not labour intensive	High usage of pesticides
Relatively low granite price	
Relatively low production costs	

The significant decrease of groundwater forced farmers to a more efficient use of irrigation. Therefore, drip irrigation is used in several cultivation areas by now. Nevertheless, grape cultivation is one of the most profitable sectors within the local agriculture.

Silk production in Gowdahalli Doddaballapura

Silk production:

Among flower production, husbandry and animal breeding, the silk production is another mainstay for Indians peri-urban farmers. Silk larvae hatch out of their eggs after 14 days. Adult moths laid those eggs. The larvae's get

feed up by mulberry leaves, which are cultivated in the area. After around 40 days of eating, the cocoon-effect occurs by a constant room temperature of 24-28 °C and humidity of 70%. Larvae's spin their silk cocoon for 3-8 days. The chrysalis inside then is then killed by hot steam or boiling. Afterwards the farmer sends the cocoons to further processing steps in order to spin the silk.

Silk production in Gowdahalli Doddaballapura

Summary:

The above-mentioned farming systems show how rural and peri-urban farmers find ways and create business models in order to satisfy the close-by urban market. Due to several mainstays (flower/silk production, agriculture and animal breeding) farmers buffer the potential loss by failure of one of the sectors. The closeness to the city and so the access to the market enable farmers to produce high yields. High yields enable the expansion of the systems (dimensional and technological) and provoke the rural-urban approximation.

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ICRISAT – Hyderabad

by Annelise Havill • 8th of March 2019

After our enjoyable stay in Bangalore, we flew bright and early to Hyderabad, where we were kindly met by drivers from ICRISAT to take us on a further 50 km journey to the ICRISAT main campus. ICRSIAT, the International Crops Research Institute for the Semi-Arid Tropics, is a research center of the CGIAR, Consultative Group on International Agricultural Research, a group which was formed in 1971 and has 15 global research centers, with a presence in over 70 countries, is the world's largest global agricultural innovation network.

The focus of ICRISAT, kindly explained to us by Joanna Kane-Potaka (Assistant Director General-External Relations), is Research for Development- with research backing solutions. So not only is the Science of discovery important, but also the science of delivery; how adoption of the science is executed is just as important as the science itself.

ICRISAT Bus (Photo Scott)

Their campus is a mix of a research center and a university, as there is a strong focus on learning and education, along with world-class research on the semiarid tropics. Climate change has and will have a large influence on farming worldwide, but the semiarid tropics are believed to be one of the areas that will be most affected due to dry land, water scarcity, poorer soils, poverty and malnutrition, therefore the soil and water management in these areas are extremely critical.

One of the initiatives that ICRISAT is focusing on is the 'Smart Food' initiative. This focuses on bringing foods that are not only good for the consumer, in terms of health, but also good for the environment and for the farmer, onto the market and to increase their popularity "Good for you-the planet-the farmer" (ICRISAT).

Their approach for this initiative is based on creating a demand pull by the consumer for the Smart foods of Sorghum, Pearl Millet, Finger Millet, Groundnut, Green Gram, Chickpea and Pigeon Pea. As these crops are high in antioxidants, calcium, protein, zinc, folic acid, iron, dietary fibre and have low glycemic indices along with no gluten, they are great quality foods for the consumer.

For the planet, they can survive with low water, and require generally less water than wheat crops or other cereals, grow faster and are generally more resilient to other cereals. For the farmer, these crops are more drought resistant, have higher yields and higher yield potentials where yield potentials of rice and wheat have tended to plateau, and these smart foods have multiple uses (fodder, food, biofuel, brewing).

These smart foods are staples, which are most relevant in developing countries, which they are targeting in order to reach the majority of people. There is so much more that could be said to this initiative of ICRISAT, but was also only the beginning of our enlightening experience at the Hyderabad campus.

The Smart Food Logo of ICRISAT

After our introduction with Joanna, Dr Anthony Whitbread (Research Program Director- Innovation Systems for the Drylands), who came to Georg-August University from March 2011 until May 2014 as

a Professor for 'Crop Production Systems in the Tropics', continued with our introduction to ICRISAT.

On the Hyderabad campus, HQ for ICRISAT, there are more than 1,500 people each day with 150 scientists, 20-30 of which are international and the rest are nationals, along with many visitors and visiting students and scientists. ICRISAT also works in around 20 countries in Africa and Sub-Saharan Africa. The original work of ICRISAT was focused on breeding improvements, but this has moved more towards agroecology-the system-focusing on soils, fertility, market opportunities and reducing poverty in these areas. However, the interest in breeding has not disappeared, with an interest in molecular assisted breeding being present. The types of farms and farmers they work with are, more often than not, smallholder farmers, where farming is not just for production, but also for living. These systems are then naturally very complex 1 ha to 5 ha, where many decisions are driven by short-term factors; food security, paying for school or food on the table for the family. These are often very high-risk systems, and therefore very vulnerable, so changes need to be handled with care to ensure they are not detrimental to the farmers. One example of work being done to help the smallholder farmers has been simply providing them with more accurate and current weather updates. As many farmers obtain smart phones, the high tech information can be sent as an easy-to-understand message, and they can also provide information to improve the predictions from their remote locations. ICRISAT is also working on attracting youth to agriculture, as we see a large migration to the cities, agriculture becomes less popular, which is already proving difficult. With their "iHub" programme, ICRISAT is also working on making agriculture more attractive for youth.

Part of the research that ICRISAT carries out involves a High Throughput Phenotyping Platform, which has been used with 255 experiments, carried out on 10 crops over the last 5 years. This equipment currently has a lazy-scan laser camera, with 8 cameras taking 3D images, from which many plant related parameters can be calculated, including transpiration. Plans include equipping this system with RGV cameras, so more information will be able to be gathered in further experiments. As we were visiting, a group of female workers was collecting roots from the soil of the planters, which were also to be measured and analysed.

High Throughput Phenotyping Platform (Photo Annelise)

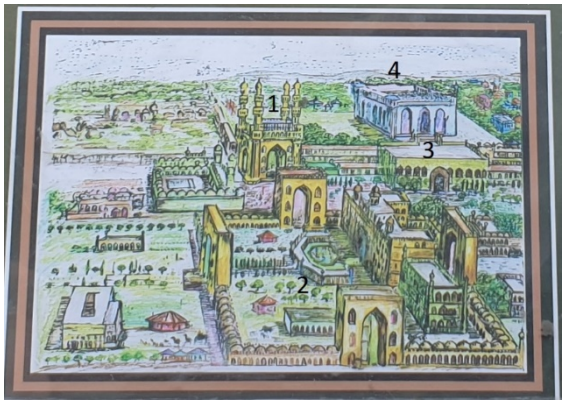
ICRISAT is also active in the Agribusiness sector, with a research group working with many start-ups, currently around 100, in many different aspects of the agribusiness sector. Part of their assistance of farmers is also teaching how to enhance their products with primary and sometimes secondary processing to increase their own profits. Some methods of increasing profits include use of peanut butter mill, flatbread machine for sorghum, packaging machines, huskers etc.

Between 2050 and 2060, the population of India will reach at least 2 billion people, where 2.3% of the worldwide agricultural land will need to feed 20% of the world population. This is a challenge that ICRISAT is helping India face with multiple differing mechanisms. Our last tour guide at ICRISAT, Murli Sharma, believes the scientific efforts are there, but the people need to keep listening to the science and encouraging it to ensure politics and the people do not get in the way of feeding the population.

Muslim Old City and Charminar

by Nadim El Nagi • 9th of March 2019

The trip to the Old City of Hyderabad was our first activity in the morning of Saturday the 9th of March. During the auto-rickshaw ride from our hotel, located in the heart of *Bigum Bazaar*, to the famous building *Charminar* we had the chance to get some first impressions of the historic city centre. When we arrived at *Charminar* Prof. Buerkert gave a short introduction about the building and its surrounding before the group had a delicious breakfast at the forecourt of the monument. Refreshed we climbed up the stairs of this historic building to see its beautiful architecture and look at the Old City from above. We received a very informative guided tour about *Charminar* and the Old Town up there before we went to the *Qutb Shahi Tombs*, which was our next activity at that day. This protocol summarizes the most interesting key facts we learned about the Old city and its monuments especially the *Charminar*.



Painting of Hyderabad´s Old City showing the position of the historical buildings. No. 1: Charminar, No. 2: Char Kaman, No. 3: Makkah Masjid, No. 4: Nizamia Hospital

Muslim Old City

Hyderabad is the capital of the Indian state Telangana counting 6.8 million inhabitants and laying at the banks of Musi River. The city was built by Sultan Muhammad Quli Qutb Shah (*1565; †1612) in the year 1591. He belongs to the Qutb Shahi Dynasty also known as Golconda Sultanate and was its fifth sultan. The Dynasty was founded in 1518 by Sultan Quli Qutb ul Mulk and lasted for about 171 years before it was conquered by the Moghul Empire in the year 1687.

The most famous theory explaining the origin of the name Hyderabad is that the city is named after Bhagmati, a woman with whom Muhammad Quli Qutb Shah had fallen in love. After converting to Islam, she adopted the title *Hyder Mahal*. *Abad* is the Urdu word for being populated. Thus, Hyderabad means Hyder's populated place or Hyder's city. As there is a Muslim majority of about 63%, one can see strong Islamic influences in the Old Town of the city. Islamic architecture is dominating, visible in the historic buildings like the *Charminar*, the *Makkah Masjid* mosque and the *Nizamia* Hospital. Furthermore, the prominently spoken language in Hyderabad's Old City is Urdu and after that comes the state language Telugu.

Besides being known for its historical buildings, the Old City of Hyderabad is famous for its Bazaar in the heart of the Old Town. The market around the *Charminar* can be separated in different sections. The *Laad Bazar* at the west side is known for its lacquered bangles, other jewellery and perfumes. The famous *Hyderabadi Lacquered Bangles* are decorated with colourful and glittering cut glass and can often be seen at wrists of women throughout whole India. If one follows the *Laad Bazar* away from Charminar, one reaches a square with stands and shops selling antiques. On the south side, there is a livestock market and a market for exotic birds in southwest direction. In the north, at *Patel Market,* clothes are being sold and on the east side, there is a vegetables market.

Hyderabad is one of the fastest growing cities in the world. A report done by Oxford Economics states that the city takes the fourth place in the worldwide ranking of cities growth rates. For that reason, many problems that India is facing currently can be observed in Hyderabad's Old Town because of the old building techniques. There is heavy traffic with no proper roads or pedestrian ways, waste

management is challenging and most importantly, water scarcity and its contamination pose a problem.

Charminar

The historical monument *Charminar* is globally known as the landmark of Hyderabad. The name *Charminar* comes from *Urdu* language and stands for four minarets. Muhammad Quli Qutb Shah built the landmark in the founding year of the city in 1591 in the centre of the city to memorialize the ten thousands of people dying of cholera, which was spread at this time. It was constructed as a mosque and a *madrassa*. *Madrassa* comes from the Arabic language and stands for an educational institution in the case of Charminar for Shia Islam education. Today Shia is the second biggest subdivision in Islam and especially practised in Iran and Iraq.

Front of Charminar (Picture by Aino Berg)

In front of the Charminar there are four gates constructed in cardinal direction, which are called *Char Kaman* or *Jilukhana* and were completed in 1594. The closest gate from Charminar is *Mewawala Kaman*, which was the main entrance of Charminar in earlier times. In the middle of the gates lays the fountain *Gulzar Houz*, another famous tourist attraction in the Old Town of Hyderabad.

Each side of the square *Charminar* is about 20 meters long and has a 56 meters high minaret with a double balcony on top of each corner. Every minaret has a winding stair with 149 steps each. For tourists only two of them are open, one to go up and one to go down. Charminar is mostly made of granite, which was polished with lime plaster and decorated with stucco ornaments. Some ornaments are also made of marble. Most of the windows and gates have keel arches, which gives Charminar a characteristically and unique look. The four clocks in the middle of each side were added in 1989 and came from London. The mosque is located on the western side of the roof while the eastern side was the court of Sultan Qutb Shah.

View of the Old City from the balcony of Charminar. On the right: Makkah Masjid mosque and its forecourt; on the left: Nizamia Hospital

As a tourist, it is possible to visit the balcony that goes around the whole square building and is located under the mosque and old court. From there it is possible to have a close look at the inside dome and the interior under the mosque. All the stucco ornaments from the inside show engravings of three Arabic words: Allah, Muhammad and Ali. This shows clearly the Shiite background of the builders that was mentioned before. Because of the central location of Charminar, one has a good view over all districts of the city of Hyderabad from its balcony. It also offers a good panoramic view on the mosque *Makkah Masjid* and the *Nizamia Hospital* close by. When the conditions are good, one can also see the *Golconda Fort* on the Hill, which is about 11 km away from *Charminar*. The entrance fee to visit the building is 25 Rs for Indians and 300 Rs for foreigners.

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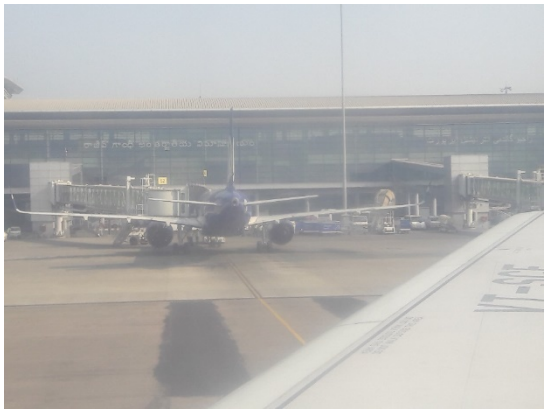
Hyderabad: Qutb Shahi Tombs

by Leon Bessert • 9th of March 2019

The difference between the last visited city of Bangalore and the city of Hyderabad reflects the diversity of India that we experienced throughout the study trip.



Arrival at Hyderabad airport. Interestingly, the airport's name is displayed in Hindi and Arabic letters

Bangalore is a very modern, extremely fast-growing city, while Hyderabad is a center of history and especially Muslim culture. In Hyderabad there are many historical places, such as the Qutb shahi Tombs. In this protocol our visit to the Qutb shahi heritage park will be described including the most important aspects about the set up and history of the park.

The Qutb shahi heritage park is listed on the tentative World Heritage list. Major conservation and landscape restoration work started in 2013 and is supposed to be finished by 2023. The park is one of the most important historic medieval necropolises in the world, comprising over 80 structures including mausoleums, mosques, step-wells/water structures, a hammam, i.e. an Arabic bath, pavilions and garden structures. All these structures were built during the reign of the Qutb Shahi dynasty which ruled the region of Hyderabad for 169 years in the 16th-17th centuries.

Vegetation

Three distinct vegetation zones exist in the Archaeological park. Native forest-type vegetation towards the northern and western peripheries of the site, characterized by boulder formations that go along with shallower soil depths. The site compromises scattered groups of trees amongst the monuments, mostly planted over the last 30 years. A detailed vegetation survey is planned to be done. It will include information about species, height, spread, girth and condition of each individual tree.

The monuments blend Persian, Pathan and Hindu architectural styles and are built with local granite. Surfaces of the historic buildings are ornamented with intricate incised plasterwork and a few monuments also bear glazed tilework. The Shahi tomb structures are derivations of the geometrical designs of the earlier Bahmani tombs of Bidar though the stucco ornamentation carried out here is on a far greater scale. The monuments of this complex played a significant role in influencing the Deccan Sultanate's architectural heritage especially in the cities of Bidar, Bijapur and Gulbarga.

Conservation work with ceramic tiles. It is not exactly clear, which monuments had ornamental ceramic tiles. However, his kind of ornamentals is typical for the Deccan sultanates.

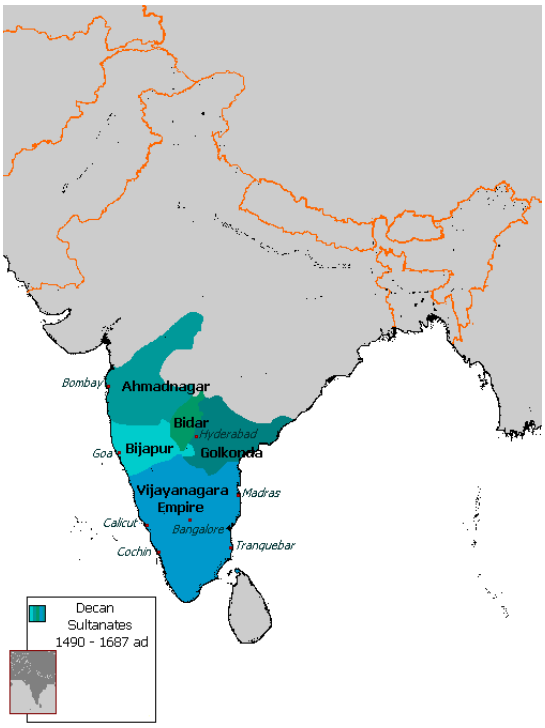
An example – the tomb of Fatima Sultana

Fatima Sultana was the daughter of Prince Mohammed Amin and Khanum Agha and the sister of the Sultan Mohammed Qutb Shah. The Tomb contains two inscribed graves, one belonging to Fatima and the next grave bears the Tughra, i.e. the seal of a sultan, of the word "Ali". The Tomb is 19 meters in height and sits on a 20.5 meters square plinth. Each side of the exterior facade consists of three

recessed aches, with ornamental stucco plaster. The key stone resembles a lotus bud. The architectural style of the tomb is more evolved over the earlier buildings and includes elements such as merlons below the domes and similar decorative patterns on the entablature.

The Tomb of Fatima Sultana

The conservation work of this Tomb started with emergency repair work to the plinth after its partial collapse in 2013. The original band at the bottom of the plinth was discovered during the repair work and was duly completed on all sides. Conservation work will include removal of all cement plaster and restoring lime plaster to the dome and wall surfaces. The ground levels of the immediate setting will be lowered to original levels.



Map of India displaying the extent of the Decan Sultanates.

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Information signs within the heritage park.

https://commons.wikimedia.org/wiki/File:Deccan_sultanates_1490_-_1687_ad.png (Map)

"Everywhere is growing" - First Impressions of Mumbai

by Sophia Hesse • 10th of March 2019

If you think, it is not worth to visit Mumbai after seeing other huge Indian cities like Bengaluru and Hyderabad, you are wrong. Mumbai is again full of surprises. We reached Mumbai, the capital city of the Indian state Maharashtra with the sleeper train on the 10th of March about noon. Most of us expected a chaotic and messy city. The opposite waited for us. The train station was really clean, and the taxis were waiting in a queue (more or less) in front of the station. Nevertheless, the city is of course still colourful and busy.

Our taxi driver was not talking that much, but he said something, what I still remember: "**Everywhere is growing"**. And indeed, everything was growing. In 2011 the estimated city proper population was 12.4 Million. The larger Mumbai Metropolitan Region is the second most populous metropolitan area in India, with a population of 21.3 Million as of 2016. In 2018 the city proper population reached already 15.4 Million and the larger Mumbai Metropolitan Region 28.9 Million. Mumbai is thereby the most populous city in India. And there is no end in sight. However, Mumbai is also the wealthiest city in India and has the highest number of millionaires and billionaires among all cities in India.

"Everywhere is growing"

As soon as we were on our way to the hotel, we could see the impressive skyline of Mumbai. The three different types of settlement pattern where easy to identify. In between all the skyscrapers, old buildings of different time periods and slums hided. This settlement pattern can get distinguished by their driving force among other things. The development of the old buildings is usually driven by the availability of time and money, whereas the skyscraper (recent buildings) where build by people with power. On the other hand, the driving force of slum development is need.

Besides its nightlife, the food and its shopping opportunities, Mumbai is quite famous for these old buildings. It is a hurly-burly of Gothic, Victorian and Indo-Saracenic architectural style of Art-déco-architecture, as well as of the remains of the British colonial era and the years of European influence. The Chhatrapati Shivaji Terminus, High Court, University of Mumbai, Taj Mahal Palace Hotel and the Gateway of India are the most common examples in this case. Indeed, you can spot all over the city these architectural highlights.

While we were trying to get to the Gateway of India and the Taj Mahal Palace Hotel, we had to find out, that there are even restricted areas in the town for Rikshas and two-wheelers, which let the traffic flow easier. However, another way to reach your destination in Mumbai is to take the Metro. That's what we did. And that can be more challenging as you think in the first moment. When the train arrived, people were trying to squeeze in and out the train at the same time, while there were shouting and even more pushing. In the end, we made it into the cabin, even few of us where hanging in the open door for a few minutes. While women can enter the train everywhere, men cannot do so. There are "Only Ladies"- wagons. However, that does not mean, that these wagons are not the same crowded as the others. However, it is important to mention, that we took the train in the rush hour.

The Gateway of India is not only popular for international tourists, but also for national tourist. When we arrived there, it was unbelievable crowded. After taking around

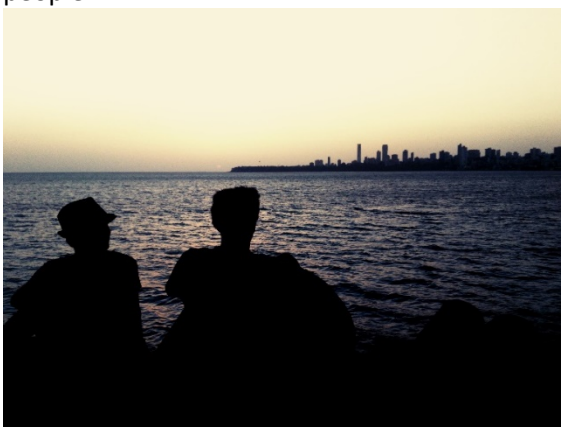
200 selfies, we were able to have a closer look on the basalt arch. It is a gigantic sign for colonial victory. The arch was built in memory of King Georg V., who once visited Mumbai, and was completed 1924. 24 years later, right before the independence of India, the last British regime marched trough it.

From the Gateway of India, you can catch sight of the Taj Mahal Palace Hotel, as long as you do not have a balk of balloons in front of your face, because maybe you want to buy one of them now or later. The magically mixture of Islamic and Renaissance architecture of the hotel, make it quite impressive. No wonder why is one of the most important town landmarks. Allegedly, the Hotel has been established by the J.N. Tata in 1903, after he was rejected as "native" by the European Hotels.

In 2008, pictures of the Hotel with clouds of smoke above it, became symbol of the terrorist attacks, when dozens of people died there, and big parts of the Hotel got destroyed. The Hotel is nowadays fully renovated again. Ironically, for most people, the access to the Hotel is denied. It all depends on the size of your briefcase. Some of us tried to get a closer look on the rooms but got prompt rejected.

Around the Taj Mahal Palace Hotel, it is a mostly touristic area, with fancy shops and expensive restaurants. However, if you walk further along the bay, tourist getting less. You can see people watching the sunset or going for a walk. Again, as in all the other places, we've been before, you can see that people dress differently depending on the region and of course the social status.

While we were watching the sunset, an old lady offered us some sweets. And who would have thought it, the sweets were super sweet. Another guy came to us, just to say, "Welcome to India", and of course some people came and asked for a selfie. And that's how another day in India ended with a bunch of new impressions and with a warm feeling due to the hospitality of so many Indian people.



Sunset in Mumbai

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Expressions of the train ride from Hyderabad to Mumbai

by Marlene Kühling • 10th of March 2019

After a cultural enriching day in Hyderabad we came back to our hotel at around 6PM to prepare ourselves for our overnight adventure: The train ride from Hyderabad to Mumbai. Although our hotel was located just fifteen minutes away from the train station and the train was only supposed to leave at 8:40 PM, we decided to book our Uber Taxis for 7:15 PM. Travelling in a big group as ours and being aware of the several unforeseen events that could easily occur, we thought that it is necessary to include an appropriate time buffer. Unfortunately, we are proved right. At least four canceled Ubers, a missing internet connection and a street blockade caused by a wedding procession later it is 8:10 PM and the last Uber group is still waiting at the hotel entrance. Luckily, the group manages to reunite at the entrance of the *"Hyderabad Deccan Railway Station"* just in time. As we arrive at the platform the friendly ticket inspectors immediately lead us our way to our compartments in the *Sleeper Class* of the *"Mumbai Express"*. Right after we sit down - before we can even distinguish whether the beads of sweat on our forehead stir from the stress of the situation, the racing over the station or the heat of Hyderabad - the train starts. The Indian cliché of unpunctuality – it seems - does not apply to the train system.

At the platform in the Hyderabad Deccan Railway Station

Trains are still one of the most important modes of transport in India. But, despite the population increase due to increased investments in the road network and air transport, the proportion of passengers has fallen slightly in recent years. The current statistics of Indian Railways show that in 2015/2016 the train route network had a length of 66.080 kilometers and carried more than 8.1 billion passengers (e.g. in 2012/2013 they carried 8.4 billion). There are a number of different passenger trains. Long-distance trains like ours which are called *Express* or *Mail*, more rapid and air-conditioned *"super-fast"* trains and the *Shatabdi Express* trains. Regional *"Passenger-trains"* and some special tourist trains like the famous *"Palace on Wheels"* also exist. Anyone who is already confused can now choose between a total of up to eight different classes. There is a first class without AC and five other ones who all have AC and differ partly strongly in prices and comfort up to private compartments which cost up to as much as a plane ticket.

The most basic and cheap class is *"second seating"* where it can get very packed on the hard wooden banks. We are staying in the next category: *Second Class Sleeper*. There are open compartments with six cushioned loungers that can be turned into seats during the day. Because vendors, train staff and other passengers frequently walk by, there are many opportunities for exciting encounters. This is how it happens to us, that in the compartment next to us parts of the group is playing music with an Indian family while we make friends with the ticket inspector, who kindly offers us "Vada" (A South Indian snack: a staple made of a lentil or flour batter fried into a doughnut shape). Around midnight as we are leaving the state of Telangana and enter Maharashtra we put up the beds, connect our backpacks and try to fall asleep to the sound of the rattling train.

After a rather short night, we are awakened by the monotonous shouting of the *chaiwala*, who serves us our first hot and sweet *chai* (tea) with milk of the day. Quickly, the daily routine goes back to its usual course. Crossing the train stations during daylight, we try to get a clearer view into the railway operation and its army of conductors, counter clerks, sellers,

Kulis (day laborers) porters and station managers. Although it first appeared as chaos, it becomes clear that the whole operation is subject to a clearly hierarchical structure. At the stations, everything has to go quite fast, so there is little room for mistakes at work.

Besides the busy train stations, we can also get a glimpse of the agricultural production along the route. We have crossed a great part of the *Deccan Plateau* during the night and are now located around fifty kilometers away from Pune in the *Deccan Traps* (one of the world's largest volcanic province, which covers an area of nearly 500,000 km² and consists of multiple layers of solidified flood basalt that together are more than 2,000 m thick). The area is at a height of more than 500 meters and determined by a semi-arid climate. Because there is less than 700 mm of rainfall during the year and most of the agricultural area is not irrigated, farmers depend on the rainfalls during the *kharif* (monsoon). Therefore, - because it is dry season - most of the crops that we see are wheat, maize and chickpea, although the area is also a large producer of sugarcane and during the monsoon season rice, sorghum and millet as well as certain vegetables and onions are cultivated. As we are leaving the Deccan plateau and getting closer to the sea, the climate changes to tropical wet- and dry and becomes hotter and moister. Here in the Konkan coastal plains, paddy fields, coconut gardens and mangos are the dominant agricultural products.

Railway agriculture and skyscrapers in Mumbai

Approaching Mumbai City District another thing that we observe is the increasing population density. The stations are now at closer distances to each other and thriving commercial areas and suburbs full of apparently abandoned apartment buildings alternate. As we enter the city, oodles of cranes appear and skyscrapers pull up from all sides. The most populous and wealthiest city of India is still growing at a constant pace.
But, the growth does not just produce winners: The losers live on the edge of the railroad tracks. In front of the modern building projects more and more slums appear.

Slum dwellings at the railroad track

The phenomenon of urbanization through in-migration from rural areas is further underlined as we discover agricultural cultivation between the tracks. As people are living below the poverty line, every possible income opportunity is exercised. Even in a relatively rich city like Mumbai, poverty reduction remains a big challenge the government does not seem to be completely in control of, yet.

After a 16 h train ride, we finally arrive at around 10:00 PM at the *Chhatrapati Shivaji Maharaj Terminus,* an impressive legacy of the British Colonial era. The station first opened in 1887 and the architect Frederick William Stevens designed it in a Gothic Revival style. It is one of the largest and busiest stations in the world and has been a UNESCO World Heritage Site since 2004. Unfortunately, we do not have much time to marvel at the beauty of the building: After the exhausting ride full of new impressions, everyone is longing for a shower!

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Slum day

by Aino Berg • 11th of March 2019

We were divided into four different groups:
1. Women NGO: LEARN
2. Waste pickers / Recycling: Stree Mukti Sanghatana
3. Band making unit: PATH
4. Leather manufacturing

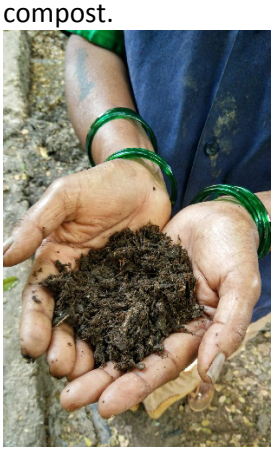
I was in the recycling group with 11 other students led by Professor Bürkert. We left at 11 a.m. from hotel by Ubers and arrived back at 6 p.m. We started our day by visiting in our NGO's office where we got presentation about their history, who they are, what they do and how they do it.

Stree Mukti Sanghatana (SMS) – Women's Liberation Organization was established in 1975. Organization is working towards women empowerment. The organization provides family counselling centres, day care centres, programs for adolescents, programs for waste pickers and solid waste management commenced operations. The vision of SMS is *"to create a gender just world by improving the lives of women through education, awareness, healthcare, and opportunities for livelihood. - - Our vision is eradication of poverty and violence, and creation of a conducive atmosphere for equality."* (streemuktisanghatana.org)
Waste picking is often mainly women work (85%, 10% men, 5% kids), women who are widowed, divorced or women whose husbands are drug addicts or alcoholics. These people belong to lowest caste or are casteless (*dalit*) without identification. Waste pickers are often seen as thieves or nuisance by municipality and citizens. Work is hard and dirty, one is carrying heavy loads and walking long distances. Waste pickers are often sick because of acid bottles and other contaminants.

"Go at home in peace, not in piece."

The Parisar Vikas - program for waste pickers was launched in 1998 by SMS. This program's interventions are: Recognition for the waste pickers (ID cards), support for children's education, formation of self-help groups (SHGs), health check-ups and medical facilities, imparting alternate skills training like composting, bio-methanation, gardening and leadership training, and formation of co-operatives to facilitate work opportunity. Moreover, this program does awareness campaigns, school based programmes, waste audits and they have their Zero Waste concept. (streemuktisanghatana.org)

After this profound presentation, we went to TATA Institute of Social Sciences for a lunch. Thereafter we went to see institute's biogas plant, which was located right on the campus. TATA institute has in total 9 biogas plants around Mumbai, of which two are in this campus. The capacity of one biogas plant is 500 kg fresh matter/day. This biogas plant was using the biowaste from campus and canteen, transforming it into the gas (methane) and compost.



High quality manure

Because of high quality waste, the ratio is 85% gas and 15% manure. This gas is used for cooking in kitchen and canteen and manure is used for campus' own garden. An employee of this biogas plant was earlier working as an unorganized waste picker, where she had to walk miles to dump places. NGO trained her for the job and taught her to read and write. Now she has been working 6 years in this plant and gets monthly salary.

Biogas plant

Next, we took rickshaws and went to the slum area near landfill to visit in NGO's school/kindergarten, where we met a group of NGO's women waste pickers. There we got a chance to ask from these women about their life and work in this NGO. They told how NGO has changed their lives: They have learnt many new things through training, which allows them to work also somewhere else now. Through NGO they get health services and their children get education and scholarships. Work in NGO has increased their strength at home in slums and they feel empowered. They are able to put money in bank for savings and they can also get group loans from bank. Number of pickers has increased because they have encouraged others also to join. We had beautiful time there and nice common moments. In the end of discussion, we took some group pictures and they served us nice cups of chai.

Chai and group pictures

"5000 SMS's members sort 23 000 kg of Mumbai's garbage every day."

From a special wish we still got the chance to visit in one of their sorting stations in other part of the slum. The NGO has in total 7 sorting stations.

Sorting station

There we saw how rubbish is sorted, treated and packed (Fig 6) for further recycling.

Women sorting the waste and bottle bale

Workers in the sorting station work normally more seasonal, shorter periods, 6 months to one year. If there is more rubbish, then they rather go to collect that because of better money.

Urban crop production & project Green Souls

by Hannah A. Graef • 12th of March 2019

In India, urbanization is taking place at a very fast rate. In 2011, 31.1% of the Indian population lived in urban areas (Bhagat 2011). With the cities' expanding population, Mumbai even crossing the 21 million threshold in 2009 (United Nations 2010), it is becoming more and more difficult to satisfy the increasing demand of city dwellers for freshly grown products.

A solution to this problem is urban farming. On limited space, intensive farming provides a large part of Mumbai's demand of fresh products. Urban crop production has many advantages: farmers can grow profitable crops close to markets reducing transportation costs, and have easy access to fertilizer and water for irrigation. On the other hand, their crops need to be constantly guarded to protect the plants from thievery and if the area is needed for construction, they have to abandon their fields. Also, high fertilizer and pesticide inputs pollute the precious groundwater, which is desperately needed for the many households in large cities. The use of wastewater or sewage for irrigation leading to contaminated products, is also problematic (Vazhacharickal & Buerkert, 2012).

Rooftop garden with vegetables and herbs of middle class family, Guwahati

For urban farming, every available unsealed or even sealed surface is used as free space along railways or free areas between buildings. Rooftops are mainly used by the growing middle class in urban areas striving to ‚return to nature': Many enjoy gardening as a distraction from the work and many prefer healthy, organic food and often are suspicious about the quality of other fresh products sold by street vendors. Thus, rooftops are transformed into small, productive gardens. Due to this trend, several organizations were found recently, as for example the ‚Earthoholics': They do workshops and offer to establish ones rooftop garden with their team (Gordon, 2013).

Another one of those organizations is the project "Green Souls" that we visited on the 12th March in Mumbai. Within the chaotic megacity Mumbai, we passed the TATA Memorial hospital on the TATA campus and were embraced by green surroundings. We walked along a short track through an alley of various edible plants and some composts and approached a large, circular hut with no walls. We were invited to sit down in the shade on mats for a discussion.

Conversations at Green Souls, Mumbai

Green Souls is a social and agricultural project that was founded by former students of TATA University. It consists of a permaculture garden on a small, unused part on TATA campus, which also means that if the space is needed for construction, they need to abandon the place. They are located next to TATA Memorial Hospital, the Advanced Centre for Training & Research in Childhood Cancers. Children with cancer, who are treated in Mumbai, do not receive sufficient fresh fruit and vegetables. Thus, all fruit and vegetables from the Products of Green Souls' permaculture garden are handed over to those children and their families to improve their diet. Furthermore, the parents

accompanying their cancer-sick children that are unable to afford lodging in the expansive Mumbai, can be accommodated for free. In exchange the parents help in the garden. However, there's even more to Green Souls: Their aim is to promote organic and sustainable farming. For this, they develop an organic, sustainable method of crop production. They also offer workshops and the possibility of volunteer work for interested people who consist mainly of Mumbai's middle class. And they provide help in the establishment of new permaculture projects, using rooftops as promising possibilities. For example, they aided an orphanage to create a rooftop garden in cardboard boxes. Unfortunately, this specific project came to an end after the director changed. Green Souls' strength is its advanced social network (facebook, twitter, website: https://www.greensouls.in/) and if they would get formally registered, they could make much profit. However, as it is, they cannot sustain themselves. With funds and donations they pay their expenses, their biggest investment being one full-time gardener. Their major stakeholders are the TATA University, visiting people and changing donors.

Mixed crops bed in permaculture garden of Green Souls

After this informative and intensive discussion, each half of our group was given a guided tour, whilst the other half relaxed and ate some of the offered dried Chiku (Sapodilla): Green Souls does not keep any animals, as those would require permanent attendance. But they follow permaculture principles: (1) They try to keep the soil covered throughout the year. This also implies that they only pull out weeds which physically disturb their crops and let the others grow. (2) They try and develop a production system which is perfectly adapted to the site conditions: They have mixed cultivation of 60-70 seasonal crops in several vegetation layers and (3) they compost most biomass bevor usage (green cuttings, buffalo/cow manure, etc.), which takes about 3 – 4 months or one monsoon to pass through.

Nursery in permaculture garden of Green Souls

They also experimentally try to do some bio-dynamic farming (following the lunar calendar and the earthly and cosmic cycle) but were not satisfied. The biggest constraint on their site is the water limitation. For this, they installed a 10,000 l water tank and are planning on drip irrigation. Apart from that they save water through mulching and raised beds which contain compost and partially also decomposing logs for moisture retention. We asked them how they came to all their permaculture knowledge. They answered: „We are taking part in workshops, we visit and talk to experts and, of course, learning by doing!" But afterwards, discussing among ourselves, we thought that this garden did not look very productive. However, even though they irrigated, of course, we need to consider that we saw the place during dry season. Anyway, using their smart practices, it should be possible to increase the productivity of this peaceful place in chaotic Mumbai.

Lokhit Pasu Palak Sanstha (LPPS) - A welfare organization for livestock keepers in Sadri, Rajasthan

by Marilena Reinhard-Kolempas • 14th of March 2019

After an adventurous overnight train ride from Mumbai to Falna we arrived at about 3 a.m. on March 14th at the campus of LPPS in Sadri. Sadri is located in Rajasthan adjacent to the Aravalli mountain range, which crosses the state in a southwest direction and leads to an arid climate on the western side of the range. Here thorn scrub forest (Acacia e.g.) are dominating. Impressed by the beautiful night sky we slept in traditional *Jhoompas* (huts) and a big tent. In the morning, the co-founders of LPPS, Ilse Köhler-Rollefson and Hanwant Singh, shared their motivation behind their work with us, pointing on challenges livestock keepers face today and their future perspective

LPPS activities and the present challenges of mobile pastoralists

The aim of the non-profit organization working with Raika and other camel nomads since 1996 is to support mobile pastoralist in sustaining and developing their livestock-dependent livelihoods. LPPS recognizes their contribution to a sustainable management of dryland ecosystems and the in-situ conservation of genetic resources.

Since 1991 a decline of 80% of Rajasthan´s camel population can be observed as pastoralists today face many challenges. Young people quit livestock husbandry and pursuit alternative income opportunities in the cities and touristic areas of India as income generation is difficult. The camel milk remains rather unpopular and the Rajasthan Camel Bill prohibits camel slaughter and transports out of the state, giving the camel the status of the state animal. Moreover, state regulations and encroachment of private land inhibit the pastoralists' mobility. Traditional grazing permits within the *Kumbhalgarh* Wildlife Sanctuary have been revoked by the States Forest Department even though the Recognition of the Forest Rights Act of 2006 aimed at providing tenurial security to traditional forest dwellers. There is the perception that grazing per se harms the forest vegetation, neglecting the year- old co-evolution of the dryland ecosystem and the pastoralist communities. Sheep and goats keep the grass short and thus prohibit forest fires. Animals contribute to seed dispersion and can stimulate plant growth through grazing. Letting animals graze on harvested arable land can enhance to soil fertility due to the influx of organic matter and nutrients. Nevertheless, farmers expand their fields more and more as they intensify (3 crops/year). Field fences out of granite stone and branches can indeed be observed throughout the area. Raika do not think about owning land. Following a system approach they decide on the movement and grazing density of their animals encompassing goats, sheep, cattle and camels based on the vegetation availability. The animal population can adapt to the forage availability if there is the possibility of movement. LPPS has understood the complexity of this socio-ecological system, where all stakeholders should be brought together: pastoralists, agriculturalists and tribal forest people. The governance of resource and land usage and maintenance should be a community task. To sustain camel husbandry in Rajasthan further research and development of alternative income opportunities is needed.

Developing further income opportunities

The group was offered an insight in such supplementary income generation possibilities on the campus of the LPPS. Out of camel dung "desert paper" can be produced, containing residues from about 36 plants. 60% dry dung and 40% of cotton are mixed and boiled for 7,5 h. Guar gum is added to the resulting pulp and after cleaning, the pulp is spread on a screen submerged in water. The resulting sheets are then dried and flattened. The "desert paper" sheets are sold for 50 Rs per sheet mainly to customers from bigger cities.

LPPS member demonstrating the flattening of the "desert paper" sheets (Picture by N. El Nagi)

As the Rajasthan´s, dromedaries are adapted to a hot environment they have a short and coarse fur, which can be separated into the coarse outer fur and the finer undercoat. In the wool processing unit the wool is cleaned, separated into rougher and finer parts and brushed. Per camel 500-600 gr of wool can be collected during March and April, the main shearing time. Per kg of wool a Raika gains 60 Rs. Because of the coarse quality of the wool, it is mainly fashioned into *dhurries* (carpets out rough wool) and scarfs (fine wool).

The Nari breeding bull statue of the Juna village

After having been showed the wool and paper factories we headed out by busses to a local organic farm. We stopped in a village, called Juna, at a central place where cows assemble in the morning after milking. A hired herder, the *gual,* then leads the cattle to the communal grazing lands. Traditionally every household owns at least one cow. A lot of care of the community is put into the selection of a breeding bull from outside in order to prevent inbreeding. A marble statue of a famous breeding bull in the middle of the place reflects the importance of indigenous livestock breeds also for the communities themselves. This statue was also built to thank the LPPS for the research done on locally adapted genetic resources and for donating this bull to the community. He is described as a beautiful bull of the Nari (Zebu) cattle breed, a dual-purpose animal with a high mothering quality and a friendly behavior. Herds are said to defend their calves and even herders from leopard attacks by forming a circle around them. They can withstand long walking distances and are well adapted to variable fodder quality.

Ilse Köhler-Rollefson speaking about the famous LPPS breeding bull

The perspective of a local organic farmer

Growing ayurverdic plants like *amla* (Indian gooseberry) and lemon trees, the organic farmer, who welcomed us, has access to the market of nationally certified organic products through an Indian brand named *Patanjali*. Besides that, he grows chickpeas, wheat and barley on a total of 150 *bigal* (25 ha) and sells them locally without being labeled as organic. The farmer depends on animals for fertilization. He cooperates with camel herders letting camels graze on his fields. Further, he owns some cows and goats for ghee and goat cheese production. Goat manure is mixed with leaves to create vermicompost. He made it clear that especially organic farming in dry regions depends on nutrient influxes via animals. Nitrogen input by legumes is often restricted by water scarcity and Professor Bürkert pointed on the missing carbon input without animal manure. When asked, why he grows organically, he highlighted the health dangers for farmers when working with chemical inputs. He mentioned high cancer rates among farmers and workers in the high input farming systems of the Punjab state. While discussing with the farmer, Ilse Köhler-Rollefson brought up the idea of branding the area of Gorwar organic, a promising future perspective if the traditional cooperation between agriculturalist and pastoralist expanded.

Discussion with a local organic farmer

Evening gathering

In the evening, we gathered at Ilse's home, where we had the opportunity to talk with and observe two goat herders while feeding their goats. A tree was pruned for supplementary feeding explaining our observation of many cut trees in the area showing newly produced branches and leaves. Later, at sunset, a fire out of dung was lighted up and some excursion participants helped preparing our dinner. We enjoyed delicious *bastis*, stuffed dough balls baked over the charcoal fire, and gratefully thanked our hosts with some group singing.

Campfire out of dung

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Ranakpur Jain Temple

by Henri Tepasse • 15th of March 2019

We started the day with an abundant breakfast at the camel hut refuge. After all participants and bus drivers were ready to start, we departed at 1:15 pm to the Jain temple in Ranakpur. The bus ride took around 30 minutes. Before we went inside the temple, all group members should make sure, that all leather clothes and cases shall remain in the bus. Also, no full coverages of black clothes were allowed and taking photos was only possible with cameras, that's why smartphones were also prohibited. (In the temple itself, other tourists took many photos with their smartphones and no security guard seemed annoyed) After our group met at the entrance hall of the temple, our guide gave us an introduction about the Jain temple and the Jain religion.

Ranakpur Jain temple in Rajasthan

Jain temple: The temple itself is around 600 years old and took roughly 63 years to complete. Approximately 2500 workers were involved in the construction process. The building was dedicated to Lord Adinath (see below). Ranakpur and the temple are named after the provincial ruler monarch Rana Kumbha. He supported the construction of the temple. For the construction, only light-colored marble had been used. The Ranakpur temple is one of the largest and most important temples of the Jain culture. It is very famous for the unique and beautiful architecture. The whole complex itself consists of three temples.

1444 marble columns, 4 main halls, 4 entrances and 24 rooms consist in the large temple. Interesting here is that each column is carved with a unique design, so each has an individual design. The interior and all statues had been created with very precise carving. A lot of details can be recognized, when having a closer look at the sculptures. For example, one carving is made out of just one single marble rock where snakes and the tails can be identified. But it is impossible to find the end tail of the sculpture.

One single marble rock with countless snake cravings. Can you find the end of the tail?

The temple's tower however remains unfinished. The geometry of the temple is in a perfectly shaped scale as well as all other perfectly carved sculptures, shrines and depictions on the walls and ceilings. A 60 years old tree grew inside the temple from the beginning and is called "Leaf of life".

Beautiful craved marble ceiling inside the temple

Also interesting to know is that a large flag waves on top of the building. This symbol means, that the temple is 'active' and people can enter and pray. Different colours and

animals cover few other flags on the roof. Red means spiritual energy, white – peace, pink – welcome of love, yellow – knowledge, lions give strength, elephants give luck. At full moon, the temple is covered with oil lamps.

Jainism: Followers of the Jain religion are called "Jains". This can be translated as a path of victory in crossing over life's stream of rebirths through an ethical and spiritual life. The religion was created around 500 BC. Their history can be traced back to a succession of 24 saviors known as tirthankaras. Jains believe that the saviors guide every cycle of the Jain cosmology. Jainism is part of Hinduism but without any cast system, because everyone is considered as equal. The religion is based on non-violence (ahimsa), non-root/non-violence vegetarianism and alcohol prohibition. Around 5 million Jain followers live in the world, most of them live in India. They form less than 0,4% of the total Indian population. To keep the karma clean, a phrase for Jains is "If you want to do something in your life, always do it with your heart", because life always depends on the karma. It is important trying to be balanced in life. Mistakes happen and will just increase your experience, that's why we must let the past go.
In Jainism, a person must be born into a religion, converting to one is not allowed. Working on the karma and considering the soul as a living substance play a pivotal role in their belief. Jains fast on different occasions throughout the year, especially on festivals. Practicing fasting is due to the removal of karma from the soul and to gain more appreciation. Meditation is a necessary practice in the Jain religion, mostly to stop the karmic activities and to give the soul rest.

Jain culture: As a Jain, materialism should not be a main emphasis in someone's life. A main principle in Jainism is the non-attachment to possessions and requires vows of no possessions of any kind of property. This also refers to non-materialistic, psychic possessions, like emotions (for example joy/hate). Jain people in general are wealthy; they have a network of many relatives and friends. Each of them takes care of another. Sharing knowledge, prosperity and mostly generosity and respect is part of this culture. It's always more giving something, rather than taking something. Jain people are very honest and reliable. They trust each other and promise their pledges. This is also the reason why these people are very trustful and reliable businesspeople and therefore are famous as a community of traders and merchants. Jains form the wealthiest community, have the highest literacy rate and the highest college graduate rates in India. Another interesting fact is that the Jain males have the highest work participation rates in India and the women have the lowest.

After this visit, our group made a stop-over in Sadri to buy some food, chai, souvenirs and so forth. Then, we headed back to our camel refuge and enjoyed the rest of the afternoon/ evening.

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Raika Camel and Goat Keeping

by Scott Appleby • 15th to 16th of March 2019

15th of March 2019

Our day started at 07:00 with bananas, tea and cookies at the Camel Charisma camp, a departure at 07:40 and and 08:00 arrival in a town where the cows were still mostly gathered in the square.

We learned that female cows were not traditionally marked, though now many of them have ear tags, and talked to an older woman selling milk. She told us that there are four local dairies, and that individuals buy from her directly to have milk for tea and cooking, etc. at home. She charges 40 rupees per liter, and is part of the cooperative, which she is selling milk in front of. The cooperative tests milk as it comes in for basic quality control (fat content), which is how they pay individuals for their milk. Buffalo milk has quite high fat content (6%) while camel milk has very little fat and thus fetches a lower price of about 18 rupees per liter.

After the milk cooperative, we continued to the home of a family which had several young camel calves (10 days, 15 days, and 1 month old) along with their mothers next to their home. The camels had very beautiful and distinctive patterns cut into their hair, which we were told are specific to each village. One must be quick to milk a camel, as the milk comes down for only a few minutes. We were invited to try fresh camel milk provided by the family, and took turns sitting on their patio enjoying the still-warm milk. The family also had a pen full of goats, and while we were sipping on camel milk, they brought some fresh loppings from nearby trees to feed some of the young goats.

From there, we walked a bit further down the road to visit a family that herds goats and sheep. They proudly showed us photos from when some of the elders went to a conserving genetic resources conference in Switzerland as a delegation for the Raika, where they pointed out that it was important to conserve genetic diversity “in situ” with the local communities, and not only the genetics. The local hierarchy was explained to us, with elder leaders at the local level representing about 12 villages, with things proceeding upward in a hierarchy to the regional level. The older men (from mid-30s to 70s and older) said that young people don’t want to do the “hard” work, because it doesn’t pay very well, and that they have a lot of arguments with young people. Because there is little interest, animal care isn’t taught much anymore. In 20-30 years, there is likely to be a complete change in Raika identity. Already the current generation keeps far fewer animals than the last generation, and predators such as leopards take 3-4 animals per month (not clear if this is per family or village). This will likely lead to the loss of genetic diversity and knowledge of how to deal with these breeds, not only germplasm.

Most young people migrate to megacities and work in service industry jobs – hotels, restaurants, low cost jewellery shops, clothing shops, etc., which provides a better income than through traditional means.

To keep younger generations in place, there must be a way to make a reasonable livelihood off of profitable work. Electrification of rural areas may help keep young people involved in the countryside, and much progress has been made there in recent years. Value-added products are important to increase income in rural areas, but there also must be a market for them, and government subsidies may be necessary at least in the short term to keep people in the countryside.

In marriage for Raika, the man's family must pay the woman's family unlike other groups where the woman's family pays. Sometimes a family will "trade" a daughter for a new wife for their son, so the daughter in law moves in as daughter to her brother's in-laws. Men used to have to work for 7 years for free (about 20 years ago) for their future wife's family before marriage, but now it is more common to pay 500,000 rupees (about 6,500 €) for wife if no daughter to exchange. Girls are often promised as children to boys – which can lead to big problems in the community if the marriage doesn't happen when they grow up.

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16th of March 2019

Today we travelled early in the morning to meet nomadic camel herders before the camels left to graze for the day. These nomadic herders are invited by farmers to graze on harvested fields, the farmers then use the camel dung as fertilizer; the camels also feed on trees.

The nomads move their herds within approximately a 60 km radius from their home village, where they have long relationships with farmers, sometimes even inter-generational. They follow a similar route each year between farmers, following harvest times. The herd we visited is the main milk provider to Camel Charisma, and this outlet for milk spurred the herders to increase their herd from 15 to over 50 camels to increase milk production. They were able to purchase the best milking camels from others who are getting rid of their herds, and so have a relatively productive herd. The males are changed every four years or so to prevent inbreeding. These herders want their children to continue to work with camels, as the income is good, about 25-30k rupees/month (~325 €). Though shepherds take their family with them as they move their flocks, the families of the camel herders remain in their home village year-round.

After the visit to the camel herd, we stopped briefly at a small-holder grain field that was being harvested. The barley being harvested was meant to be animal fodder, but they also had fields of wheat for their own use, as well as some vegetables. The work is very labor intensive, and was being done primarily by women, as we often saw in other contexts as well

"A short, relaxing bus drive" – Aravelli Range and Kumbhalgarh Fort

by Florian Holz • 16th of March 2019

After recharging our batteries in the paradisiac Raika camel project, we now made our way to Jaipur. Most of the day we spent in three small tour busses with great relaxing Indian music – i.e. at least to some maybe. Nevertheless, we encountered many interesting things on the way.

From the wide plains around Sadri we first went up the mountains to the Kumbhalgarh Fort, an immense fortress we had already seen from our accommodation. A distance that somebody said we could walk in three hours, we made in two hours by car as the only paved road took a long detour. This gave us the chance to see the vegetation changes in much detail. In the plains, wheat fields and scattered trees had dominated the picture. On the slopes of the Aravelli Range, we now encountered a comparatively wild and dense forest. When we passed it, three and a half months before the monsoon, already most of the trees had lost their leaves. As we had learned before, farmers and herders from the plain would go into these forests and cut branches to feed their animals or to mulch their fields to add carbon. On top of the mountain range, sort of a hilly elevated plain opened up. Vegetation became sparser and consisted rather out of bushes than trees. In contrast to the forests before, some areas were again more of a man-made landscape. Terraces and breast-high stonewalls shaped the landscape. While in the plains we had seen many zebus we now encountered more buffaloes. In contrast to zebus, they are better equipped to handle a lot of low-quality roughage typical for the mountain vegetation and still deliver a decent amount of milk.

Around noon, we arrived at the 15th century Kumbhalgarh Fort and got some time to visit it on our own. Standing in front of the massive main wall was already most impressive. The outer wall extends over 38 km and is thereby the second-longest continuous wall of the world, after the Chinese wall. The sight of it makes it easy to believe that the fortress was conquered only once – after the defenders ran out of drinking water. The big area within the walls holds over 360 temples, water basins and farms. However, most of us were attracted by the main fort that towers above the whole area and gives a nice view to all directions. Of especial interest were some dark and empty rooms in the main building. They were perfectly made for creating a massive sound when humming with three or more bass voices. Unfortunately, our audio recording was not a big success...

"Look! The landscape!" - on top of the Kumbhalgarh Fort

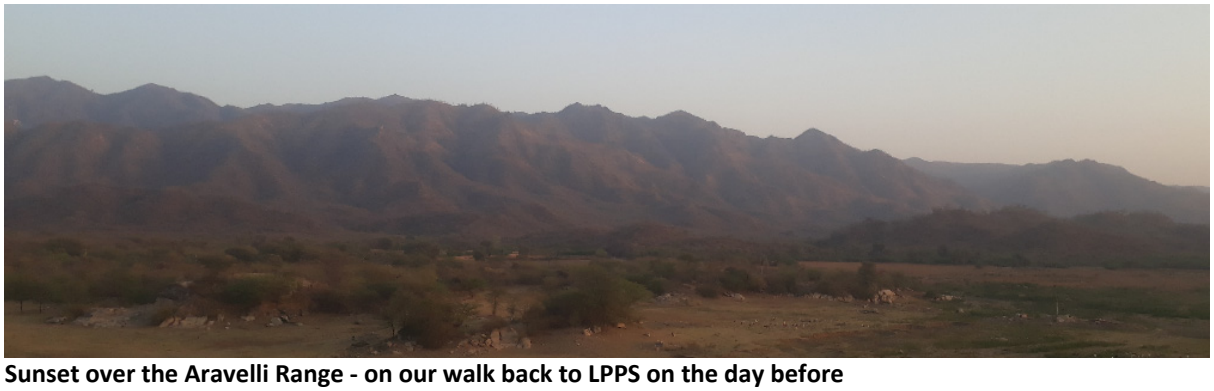
About one hour of driving on we suddenly had to stop. One of our cars had a burst tire. This gave the rest of us the opportunity to walk around a bit, respectively Professor Bürkert to come up with another lecture. Indeed, the place of our short break was perfect. Two things we encountered here were very typical for the region. One was a deep stone water reservoir. On one side, there were steep steps to fetch water with buckets. On the opposite side, a stone construction loomed over the water that was formerly used to pull up water with the help of an ox. The small diameter but

high walls of the reservoir, and the bushes and trees growing over the sides of the basin ensured that only little water would evaporate. Such reservoirs can be seen all over the area and explain how people were able to make agriculture in this dry region even before the technological innovations of the green revolution. Not far away we could get a closer look of one of the grain storages scattered around most of the farms. On top of a huge straw ball, some stalks were bound together, to build a roof that protects the rest from rainwater.

The water reservoir

Another issue that kept me busy that day was the question of poverty. Before that day, we had heard that Rajasthan is one of India's poorest states. However, something made me wonder. Indeed, infrastructure and housing was less developed than in other places. Many houses along the road were concrete buildings with a veranda but a quite small living space behind the front door; buildings you would see exactly of the same style in countries in Africa and South America, seemingly bare of any cultural influence. Those are buildings easy and cheap to build, designed to serve basic needs. But here is exactly the thing that struck me. They *were* concrete constructions and they *were* able to fulfill at least some basic needs relatively decently. Those were way better buildings than the slum buildings we saw in Mumbai, for example. Of course, housing is only one example and later in Jaipur when street children were asking us for money we all faced more extreme sides of poverty. But the numbers confirm the impression: Rajasthan is one of the low-income states of India but its net state domestic product (NSDP) per capita is higher than those of all the other low-income states. Most importantly, Rajasthan has a comparatively low poverty rate. While in Chhattisgarh and Jharkhand more than 35% of the population lives below the poverty line, in Rajasthan it is 15%, which is below the national average of 22%. Now how is that possible? Rajasthan has reduced its poverty tremendously since 2005, also because growth increased. More importantly, the faster growth had a stronger than usual impact on poverty reduction. Many see the main reason in the successful social welfare schemes of the state. Apparently, one of the most successful interventions was a 2011 healthcare scheme: Making many basic drugs and those for the treatment of cancer, diabetes, asthma and heart diseases free of cost has taken a burden off citizen's shoulders. Formerly high medical costs made many people getting heavily indebted and pushed them below the poverty line. After all, there might be much to learn from Rajasthani politics.

So, even if many of us felt exhausted by the bus drive, the day was full of new experiences.



Sunset over the Aravelli Range - on our walk back to LPPS on the day before

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Social enterprise Jaipur

by Marie-Camille Mathieu • 17th of March 2019

At the end of the Sunday 17th of March, in the afternoon, we have reached a shop which belonged to the uncle of our guide. It is a social enterprise of textiles called “Incredible Textiles”. Here can be found various of textiles from every prices: from 500 Rs to more than 25 000Rs. This is due to the differences of technics employed, the number of fabrics used for one piece…. The main method that they are using is called “block printing”. These blocks are hand-made, using wood. The stamps are then immersed in different paintings. The colours used are all natural: indigo flower, saffron, chili flower or other spices… On one fabric up to 7 colours can be used. After 24 h of drying, the fabrics are put in salt.

The cotton used as a fabric is exclusively organic. But he is also using silk and other sorts of fabrics, which are not organic. According to the number of stamps and colours used, the prices will rise. One can also choose a fabric and he will sew it according to the template selected. This just requires half a day.

Some of the fabrics are also made with additional handwork, other than just block printing. They require more time and are more costly (15 days for a bed cover for example). They can also collect and use old clothes from the countryside, especially old wedding dresses which are not considered as fashionable anymore. Then they sew them together, as we can see below for example.

Different sorts of bed and pillow covers

But what makes this company a social enterprise is that it is employing 265 women for these activities of tissue printing. They are payed a fair price for their work. They are working from their home, in the countryside of Jaipur, and everything is furnished (fabric, stamps). This is allowing 265 families and especially the women, to have a job. They will earn 35% of the price as a share.

Different sorts of bed and pillow covers

Indeed, a social company should be first of all able to generate a social benefit, in order to finance all or part of its actions. It is different from a basic company because it reinvests its benefits to pursue its social “mission” while insuring its financial viability. So we can see that these fair salaries given to the ladies allow them to live decently and assure a future to their children. But in order to absorb these costs, the company is selling its products more expensive.

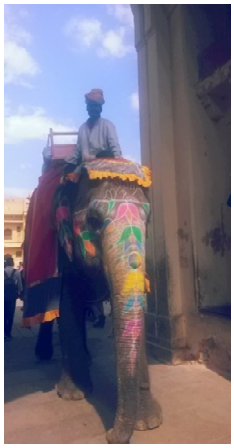
Furthermore, the company also has a charity program which is helping children up to 50 km from Jaipur. So they use their benefits in achieving a social mission.

Bed covers made using the block printing technique

Working Elephants in Jaipur

by Yakima Schwenger • 17th of March 2019

Elephants have been used to do many tasks, as for e.g. road buildings, pull wagons; some were trained to salute foreign leaders, decorated for important occasions in temples and agricultural assistance work. During the excursion, we also saw working elephants indirectly at the carpentry station in Kerala, as there where big tree trunks that were rounded so that the elephants would not hurt themselves while transporting and manoeuvring with them.



Elephant arriving in the Amber Fort after transport of tourists

When we visited Jaipur, we visited the elephant keeping organization founded by Mahoot which overtook this project from his family and aims to keep these animals to protect them from misuse and educate about their needs and better living conditions as for e.g. by promoting the ban of the transportation with chairs, as it causes pain to them. Around 500 years ago the Maharajas took the elephants out of the wild to use them for domestic purposes. Nowadays the estimated population of Asian elephants in India is around 30 000 in wild areas, but unfortunately the Indian elephant has been listed as endangered on the IUCN Red List due to habitat loss and poaching.

The organization keeps 125 elephants in the state of Rajasthan, mostly females and 4 males for breeding purposes. They are kept to protect them from being used and keep this species from extinction. Some of the elephants were rescued from the circus and were firstly healed applying a mix of coconut oil and paint on the wounds. These elephants live up to 90 years. The ones we can see on the pictures are between 20 and 30 years old. They require 200 to 250 kg of food per day and drink around 45 L of water each morning and evening.

They are fed with sugarcane, bananas and chapattis that are cooked by the organization members. They also plant different types of plants and vegetables besides the activity area to feed the elephants.

To finance the organization many activities such as riding, washing, feeding and painting is done in the small shaded structure where we saw four different elephants. The elephants kept are mostly females as they are less aggressive. The females excrete white liquid when they want to be with a male, for that they are given three weeks. The females usually have three babies in a lifetime. Having only four males, were also only two of them are still fertile cause the other ones are too old, inbreeding can be a problem over time, which also can be seen in the bleached pink areas in their front face and ears. That is why Mahoot buys a male from time to time in the next city, which can get very expensive.

Group of elephants kept by the organization

To cover all the expenses for the elephant protection besides the tourist activities, Mahoot's wife runs an Instagram account to captive people for donations in an "Adopt an elephant" programme.

The elephants have a very good sense of smell and memory, rather than their vision capabilities which are not that good. They are able to remember the human natural smell even after years. The Indian elephant is characterized by its freckles and small ears. To get to know an elephant you should start to stand beside him and not in front and start to touch his forehead and nose and then if he accepts it, pass to the front legs and stomach. If its trunk goes up or it opens its mouth, the

elephant accepted you and you are allowed to hug him. Water should for e.g. not go on the front face in order to protect its front hair. For colour festivals, only natural colours are used.

The only work these elephants have to do is to participate in the so called festivals and sometimes in marriages of upper class families. In addition, the Indian government takes a kind of tax from the elephant keepers, where the keepers need to surrender 20% of their stock for tourism work. In this case, they have to transport tourists up to the Amber Fort. To reduce the impact on each of them, Mahoot rotates between the elephants excluding the circus rescued elephants as they have had a hard past already. Another service the organization offers is the elephant manure, which is given away to poor people, which can grow food with it. If you hear "Agar Agar Agar" in Jaipur, you can know that an elephant will start to walk, or if you hear "back" an elephant will sit down, and if the elephant is walking and you hear "back" from their keeper it will slap to the side.

Excursion members, organization founder Mahoot, his helpers, Ali and his family, rickshaw drivers and our new elephant friends

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Working conditions on tea plantations in Assam

by Fridtjof Marcus Hansen • 19th of March 2019

Before we set out to the tea estate in the early morning of March 19th, we got a short introduction about the situation of tea production in India with main focus on the Assam region.

According to Prof. Debdulal Saha, who guided us to the Tea estate, since 1999/2000 there is the notion of a national tea crisis (eg.: thehindubusinessline.com 2019), especially highlighted by multi-national companies. They would claim, that due to the low prices and high competition on the tea market as well as the production of tea by smallholder farmers, it would be impossible to improve labor conditions like paying a minimum wage, which is in Assam officially 250 rupees per day, half in money, half in food (rice, wheat). This argumentation is used to keep the labor- and working conditions in the current critical state, which is strongly debated in India (eg.: www.globalresearch.ca 2019). On the contrary, one could argue that the big tea companies like TATA Tea even carry a lower risk, having the tea production carried out by smaller farmers. These farmers than are the only ones who suffer from pests, miss harvests and other risks connected to production. At the same time, they are tightly bond to and dependent on the company to which they sell their tea and which can dictate the quality farmers have to supply and the price they get for it. In that scenario, the companies even would not have to supply the workers with the facilities, plantation workers have a right to by governmental law – housing, sanitary, fire wood, education and health support – and consequently safe even more money. From this perspective the discussion about a tea crisis, in connection with farmers themselves producing tea, seems like a farce and a well working lobby mechanism. Although the current government of India is supporting self-employment and smallholder farmers, their situation is still very difficult. The specialization on high quality tea with own marketing was discussed as possible solution strategy, which has to come along with education. Many of the tea estates Prof. Saha asked to show us around refused to do so, presumably because they were not willing to have the working conditions seen. The debate about labor rights and unbearable conditions for workers on tea plantations has made them cautious. This leads to the assumption, that the tea estate we were allowed to visit would probably not be one of the worst cases. We have to keep this in mind, interpreting the things and conditions seen on the estate.

Conditions on the estate

Arriving to the estate, the young owner showed a high eloquence in talking as well as hosting people, making his guests feel like kings and queens. The way our host and owner of the land was directing his personnel to serve us and him,

anyways reminded at colonial times, creating the notion of a big hierarchical difference between him and the working personnel.
At first, we got a guided tour by the owner, escorted by his manager, through the fields to the factory, giving us an introduction in tea management, answering our questions. On 1000 ha land, he has 3000 workers employed for both plantations and factory. Arriving at the factory we found only male persons to be working there – spreading the freshly harvested tea leaves for withering in the withering floors, watching the machines, spreading and collecting the fermented black tea among other jobs. From our short visit, the conditions for workers at the factory itself seemed to be normal. Walking on to the workers in the tea plantations, we got the chance to ask more about general working conditions: Since end of March is just the beginning of the season, all workers were hired on a daily basis, working from 8 am to 4 pm, six days a week. They would have to collect 23 kg/day in order to receive the full payment, for more tea, they would receive extra money.
Officially the tea estate provides all workers with free housing in labor quarters, firewood, health care, and education. Pregnant worker get a 6 months payed break. Additionally the government supports with 3 nutritious meals for school kids. That's, what the manager told us. Asking the women in the field, they told us, that the protection cloths they wore, were only handed out for today's visit, that they do not get the minimum wage but only 130 rupees (~1,60€) per day plus additionally 3kg of rice per 4 persons every 15 days. In comparison to Kerala, where the minimum wage is 350 rupees, this payment seems to be ridiculous.

But how is this system of exploitation kept on working?

In the evening we learned, that the root, lays well back in history, when the British colonial rulers brought workers from the Jharkhant region and neighboring belt areas, to work in the tea plantations. The current workers are 3rd, 4th, or 5th generation of descendants of these workers. Due to a lack of proper education and integration, they still do not speak the Assamese language, but rather their own local dialects and are hardly able to work outside the plantations. Leaving the plantation would mean, to give up the little security they have – may the working and living conditions bad as they are, they still provide some kind of security. Stuck in this dilemma, it is very difficult for the workers to stand up and fight for their rights, for the compliance of Indian law, for minimum wages and better living conditions. Although there is a union of labor, which is supposed to campaign for labor rights, we learned that they do not fulfil their job. According to people we talked to, the union members are not correctly elected and hence do not fight for better conditions.
As a result of all the mentioned drawbacks, the conditions of Assamese tea estates continue to be precarious. In Kerala, people use opportunities to work outside tea plantations and even outside the country, leading to a competition for workers. At the same time, opportunity costs for tea workers are higher – to make people work in tea, the plantation owners have to pay higher wages and offer better working and living conditions. In Assam anyways there is a lot of labor force available, leading to competition for work. Consequently the laborers have low bargaining power to claim better conditions, contributing to the continuance of the labor rights violations too. To improve the situation of tea estate workers, several things can be done. Firstly the state has to enforce and control the compliance with the law (minimum wages, housing and working conditions, health care, …). Secondly, the education of children of tea workers has to improve in order to enable a real chance to find work outside of the plantations and to know and stand up for their rights. Furthermore, tea estates themselves could specialize or focus on high quality tea rather than mass production, and marketing the tea without big companies absorbing big parts of the profit margin. In this way they would be able to pay higher wages – still the will to do so is needed anyways.

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Chai, chai, chai - Tea production in Assam

by Karoline Kröner • 19th of March 2019

What is a day in India without the sweet, milky chai out of a little paper cup?

India, and especially Assam, is a famous area for growing tea, being exported over the world and well known for its high quality and excellent taste. The origin of India being a tea producing country just goes back to the early 19th century, when the British East India Company started cultivating Chinese tea plants and introduced a large-scale tea production in Assam. Nowadays, India is one of the biggest technologically equipped tea industries in the world.

There are two different plant varieties dominating the Indian tea production:

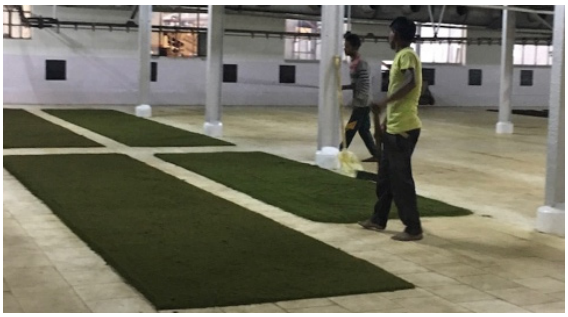
Camelia sinensis var. sinensis, nowadays mainly cultivated in the area around Darjeeling and due to its tastefulness mainly produced for the export to western countries, and *Camellia sinensis var. assamica*, which can be found in the plantations and cups in the rest of the country, favored by Indians because of its strong taste.

Today, we got the possibility to get deep insights in the cultivation, production and story behind the darkish, hot and tasteful drink companying us along our trip. We visited a 26 acres tea garden surrounding an old fashioned factory in the center of Assam, employing 3000 people and being led by a young guy in 5th generation. The guy was welcoming us and immediately struck by his perfect English, his westernized behavior, and his dominant, strong but quite friendly character. First he took us around his property explaining us cultivation conditions, the production steps and by having a delicious and rich meal afterwards we got the chance to ask questions about labor conditions and his personal incentives to run this business. With the background we already gained by visiting tea gardens and a factory in Kerala, we looked at everything with an advanced and more critical view and were able to draw parallels and observe differences among this two tea production sites.

The optimal circumstances for growing tea are hilly landscapes, slightly shady and tropical to subtropical climatic conditions. The plantation in the lowlands of Assam tried to mimic these optimal ecological conditions under which tea has developed by the construction of cannels to enable sufficient draining and the planting of shade trees to avoid sunburns and reduce the growth effect. The pH- value of the soil lies between 4.5 and 5.5, which can be achieved by proper liming. Besides these optimal growing conditions, the quality of the tea mainly depends on the right time of plucking. Plucking season starts in March and last till September, during the winter season, maintaining work like pruning is happening. In one summer, a single plant is getting harvested over 30 times. Constantly plucking is important to keep the quality, and is enabled by a rotation system between the fields. The flush period is in June, where the entire factory is flooded by fresh tea leaves. The highest costs of producing tea are the plucking cost. But as there are no labor constraints in Assam, tea can be harvested by hand: just the youngest two leaves and a bud find their way into the basket, carried around by all the colorful clothed women working in the sun day by day. In Kerala, a state which is characterized by labor scarcity, the plucking is partly done with scissors, leading to a lower quality but faster and cheaper harvest. After hurting the leave structure by plucking, compartmentation of the cells is happening, plant juice comes out and the natural protection mechanism of the plant is started.
To avoid undesirable flavors and quality minimizing damages, the freshly harvested tea

leaves need to be further processed as fast as possible. The factory, where all the internally plucked tea leaves are delivered to, is placed in the middle of the tea gardens and was constructed over 50 years ago. The energy for the industrial processing comes from both a lot of manpower and the “Lister Blackstone” engines, Indian fabricate and still working perfectly without any trouble.

Depending on the desired tea flavor, the further processing of the leaves faces differentiated production steps. White tea and Green tea are unfermented teas, which require fast steam handling to stop the oxidation process right after delivery. To produce Black tea, the tea leaves first went into a tea bed house for an eight hour withering process to reduce the moisture content from 70% down to around 58%.
The leaves are manually placed, dispersed and collected. To avoid silage effect during the withering process, turbines blow cool air through the nylon mash on which the leaves are bedded and cause an evaporative cooling effect. Afterwards, the ready withered leaves will further be rolled to destroy the cell structure and prepare them for the fermentation procedure.



In case of the visited factory, the product selection is quite monotonous: they are just producing c.t.c. tea, which is mainly consumed by the Indian society due to its strong taste. c.t.c. stands for “crushed, teared, curl”, which are the production steps for this kind of tea before fermentation.
In contrast to the leave tea, which is consumed after pouring boiling water over it and letting it steep for a couple of minutes, c.t.c. tea is prepared by boiling water together with milk, sugar and masalas in one pot for a while and then served.

The most important step to develop the required taste in Black tea is the fermentation. The oldest method to ferment tea is the “floor fermentation”, where the tea is passed out as a thin layer over the floor and left there for approx. 80 minutes.

Due to a lack of labor, in Kerala the automatized “Continuous Fermentation Method” is usually used, being known for lower quality results. After the fermentation, the tea is dried by a vibro fluid bed dryer to a water content of 2.5% to avoid moulding and to stop the ongoing chemical and biological reactions.

Finally, the tea has to be segregated by sieving. The size of the particle is deciding about the quality and price, and for each of the eight different quality classes there is a market. The company is just producing tea for the Indian mass, in comparison, about 95% of the Darjeeling leave tea is produced for external markets. The owner took the low tea prices at the market as a reason for him not being able to pay his employees the minimum wage, but just 280 rupees a day and even this little amount not monetary, but partly in food commodities. In

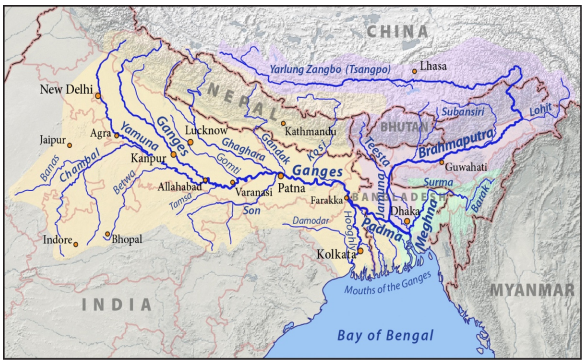
producing more specialized products, developing an own brand or shifting a part of the gardens to organic tea, I do see a chance for the company to improve their economic situation without depending highly on the wholesale market prices. But for this kind of investigations, the owner needs to push effort and a risk-taking behavior in his enterprises. He needs an entrepreneurial spirit and the will to make a change.

Due to this interesting visit, maybe next time we are drinking the chai at the street corner the impressions we gained today will come to our mind!

Uzan Bazar and the Fish Market, Guwahati

by Marcelo Gerlach • 19th of March 2019

The Brahmaputra river is one of the most impressive and major rivers in Asia. With its origin in the northern side of the Himalaya, it flows through China, India and Bangladesh to reach the Bay of Bengal. It is a river with periodic flooding during the monsoon time between June and October and is characterized for the transport of big quantities of sediments fed from the Himalayan Mountains that nurture the fertile soil of the Brahmaputra river valley. Thus, flooding, sediment deposition, agriculture and agricultural practices are closed related and people rely on the seasonal flooding of the river for the land use. In the past years, higher temperatures during spring time have led to higher amounts of ice melting from the Himalayan region subsequently creating higher flooding and affecting the land use systems in the nearby flood plain soils. Furthermore, the river is home for a high variety of fishes and people living near to the river have relay on fishery for food consumption. Today, the fishing tradition is still alive and people have learned how to fish during monsoon season and non-monsoon season.



Map of the transboundary river Brahmaputra

On the early morning of the Tuesday 19th of march, our student group headed the shores of the Brahmaputra river to have a look at the oldest fish market of Guwahati in Assam. It is situated at the banks of the river in Uzan Bazaar, one of the oldest districts of Guwahati, a residential and commercial center with beautiful houses along the river. In the morning times, from 6 am in the morning, plenty of people come to the market to purchase fish in small and big quantities. It is said that the market dates back to the days of the Ahom rules and was founded around 1816.

As we arrive, many small stands are allocated along two platforms of cement in front of the river, one higher one, at the level of the promenade and one lower one, near the river shore. People are talking to the fish sellers, prices are being handled and different kinds of fishes are recognizable. There are fishes kept in small amounts of water alive, others have been sliced, there are big and small fishes and every stand is sorted a little bit different. As we enter the market, to sections of the market are recognizable. The upper platform is a whole-sale market, while the lower section is a retail-market. This is quite interesting to see, because the fish market is not only selling fresh fish from the river, but it is also re-selling fish from fish farms mostly allocated in Assan, but coming also from other states.

The local fishes caught in the river are mainly *Rohu, Chitol, Ari, Barali Bhokuma* and more. Most of them are kept alive in metal baskets with small quantities of water, so they can be sailed as fresh as possible.

The sellers tell us they are independent and pay 50 Indian Rupees for the stand. In March it is no monsoon season yet, so they say it is more difficult to get enough fresh fish for the demand and they have to work longer to supply the demand. In the monsoon time the higher floods bring more fish and are caught in the flood plain. During this time, many also fish in the flood plain ponds left behind. The fisherman point at the river shore to show their fishing boats, small wooden boats, around 5 to 7 meters long, with a small roof made of bamboo and some equipment in it. They say, the best time to fish is during the night, when the fishes

are more quite. It is the when they release their fish traps and come back in the morning to either sell it to the wholesale dealers or by themselves. It is a hard and risky job they say, the high and low tide and the weather changes can be risky while been outside and night and the money they get is usually not good enough.

Lower platform of the fishermarket.

Bike, biker and bags ready for the delivery service

Furthermore, the government has established regulations for the quantity and estate of the fishes caught. For example, there is a minimum fish size to be respected and pregnant fishes must be given back to the river. Nevertheless, the resource management is challenging in such a major river, because it is not quite clear who the stakeholders are. Thus, they say, overfishing doesn't seem to be a big problem, it is rather the high amounts of pollutants in the river that are threatening the fish quantity, quality and diversity.

In the upper Platform the wholesale-market is running simultaneously and it is hard to say which stand corresponds to which kind of business. Here we get to know that they purchase fish from the local fishers of the Brahmaputra river, but they get also a large portion of fishes from fish farms that work on a mass production scale coming mostly from Assam, but also from other states. These fish farms have no regulations or rules to follow, it is difficult to control the management of the fishponds respecting inputs and outputs. Thereby the prices are considerably low and the fishes are usually sold frozen. Furthermore the quality of the fish is probably not good considering the high amount of inputs they probably get. They even are registered in the internet and have a deliver service: "We are fresh fish suppliers of any kind. We also deliver to your home and supply fish for marriage parties and restaurants etc. Contact us in our number for any queries."

While the demand for fish is increasing, and the wholesale dealers are good organized, it seems that the quality of the fish the population consumes is drastically decreasing, either because of the pollutants in the Brahmaputra River or because of the high input systems without regulation in the fish farms. The Guwahati population should be aware of this to take care of their local fish diversity and quality.

Kaziranga National Park – Fauna

by Kira Fastner • 20th of March 2019

Kaziranga National Park is located in the Golaghat and Nagaon districts of the state of Assam in India. The park area is circumscribed by the Brahmaputra River, which forms the northern and eastern boundaries, and the river Mora Diphlu, which forms the southern boundary. Kaziranga covers an area of 430 km² and is an UNESCO World Heritage site. The park is known for hosting two-thirds of the world's great one-horned rhinoceroses. Kaziranga is also home to the highest density of tigers among protected areas in the world, and was declared a Tiger Reserve in 2006. Large breeding populations of elephants, wild water buffalo, and swamp deer live here and Kaziranga is recognized as an important bird area. When compared with other protected areas in India, Kaziranga has achieved notable success in wildlife conservation.

On 20th of March, we got the chance to explore Kaziranga National Park's biodiversity and diverse wildlife on the back of an elephant.
Our day started right after sunrise at around 6.30 a.m. after a short but silent night in a resort located directly next to the park. Jeeps took our group to the spot where we met around ten full-grown elephants with four calves. Two to three people and one guide could ride on one elephant, on a back-friendly elephant-saddle. Could one imagine to better start the day than with a herd of elephants?

The elephant herd spotting a rhino with its calf

We passed different dear species, e.g. hog deers and swamp deers, different bird species until we spotted our first rhino with its calf. It was a peaceful encounter, we could take some nice photos and observed how the animals behave in the wild.
After seeing two more full-grown rhinos and examine the rhino toilet (they use a specific spot as their toilet for six to seven months after changing the toilet location) the tour ended, and we left Kaziranga with more unique impressions of what India's wildlife has to offer.

The Great One-Horned Rhinoceros

Fauna

Apart from the above-mentioned animals we saw during our tour through the park, notable wildlife of Kaziranga National Park includes significant breeding populations of 35 mammalian species, of which 15 are threatened as per the IUCN Red List. The park has the distinction of being home to the world's largest population of the Greater One-Horned Rhinoceros (1,885), white Asiatic water buffalo (1,666) and eastern swamp deer (468). Significant populations of large herbivores include elephants (1,940), gaur (30) and sambar (58). Small herbivores include the Indian muntjac, wild boar, and hog deer. The One-Horned Rhinoceros, Royal Bengal Tiger, Asian elephant, wild water buffalo and swamp deer are collectively known as 'Big Five' of Kaziranga.

Conservation Management and Sustainable Wildlife

The premier species (tiger, rhino, and the elephant) targeted for protection in Kaziranga National Park are land-dependent vertebrates, even while most of India's 1.1 billion plus citizens are dependent in part on natural resource extraction. Conservation can, therefore, pose economic hardship on local people. The social and demographic landscape is complex, rural lifestyles are marginal and resource competition can induce conflict. This is among the most difficult situations for conservation. India has been progressive for both conservation and social causes by implementing a national program to improve local livelihoods and conservation. The Government of India (1983) recognized the multiple-use demands on lands bordering protected areas and recommended development inputs to reduce dependency.

Various laws have been enacted for protection of wildlife in the Kaziranga National Park. Poaching activities, particularly of the rhinoceroses for its horn, has been a major concern for the authorities. Preventive measures such as construction of anti-poaching camps and maintenance of existing ones, patrolling, intelligence gathering, and control over the use of firearms around the park have reduced the number of casualties. By leaving the park we could see some of these preventive activities.

During monsoon season, flooding and heavy rains result in death of wild animals and damage to the conservation infrastructure. Many animals migrate to elevated regions outside the park boundaries where they are susceptible to hunting, hit by speeding vehicles, or subject to reprisals by villagers for damaging their crops. To mitigate the losses, the authorities have increased patrols and created artificial highlands for shelter.

Observing the wildlife, including birding, is the main visitor activity in and around the park. Increase in the tourist inflow has led to the economic empowerment of the people living at the fringes of the park, by means of tourism related activities, encouraging a recognition of the value of its protection.

On our way back from the park to Guwahati we stopped at a small village some kilometers away from the park in the countryside where we had lunch, including great hospitality and nice local food. Accompanied by a local WWF activist we were taught about the mentioned conservation issues.

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The Indian Holi Festival – an observation of traditional customs and aligned problems

by Maximilian Ibing • 21st March 2019

Introduction

The official last day of our excursion started with our last duty in India – participating in the oral exam. It was held in a comforting atmosphere from 6 am till noon, at the balcony of Prof. Bürkert's room. By chance, this official end of our excursion and the start of one of the most important Hindu festivals - the Holi festival - coincided on the same day, the 21st of March. The Holi festival is traditionally celebrated as the end of winter and the beginning of spring, more precisely at the last day of full moon of the month "*Phalguna*", usually around March. Back in the days, it was a festival that celebrated the win of spring over winter, thereby it could be considered to be some kind of harvest or fertility festival. Or simpler; the win of good over evil was celebrated. Disputes shall be buried during those days and social borders, especially those of the caste system, become blurred. As time moved from 6 am to noon, the city kind of woke up, music was humming from all areas and the later the more people walked around colored and in a festive mood. There is a high variety of tales about the origin of the Holi festival, the most common ones are:

The Tale of Holika and Prahlada

The young prince Prahlada refused to pay god-like homage to his father Hiranyakashipu, since the boy believed in the god Vishnu. The father was really upset, so much that he tried to kill his son, but thanks to the son's strong faith he remained unharmed and protected by the god Vishnu. Hiranyakashipu worked out a ruse together with his sister Holika who is considered as a demon. Since the sister was somehow protected against fire, they decided that she would jump into a fire together with her nephew in her arms, the prince Prahlada. But while Prahlada prayed to Vishnu and somehow survived the fire, his aunt, the demon Holika was killed by the fire. Based on this tale, it is a common ritual in India to incinerate a straw-figure in a bonfire that represents the demon Holika and to celebrate the "right" religion and the win of good over evil.

The tale of Krishna and Radha

For some the Holi festival is held in remembrance of the undying love of Lord Krishna and his love Radha. Young Krishna was really concerned about the fact that while his skin was of a dark color Radha's skin was way paler. He asked his mother for advice and how to overcome this problem. She suggested to make use of colors. Krishna would thereby be able to paint her face to any color he liked. But since Krishna had a childish attitude, he did not only put colors on his love but also threw colors over all the "*gopis*" (female cattle herders). Many consider this tale to be the true origin of the Holi festival, at least when it comes down to the use of colors.

Painting of the god Krishna, playing Holi with the *gopis*

The customs and issues of the festival

The Holi festival is considered as the festival of colors. Depending on the region within India the Holi festival can last between two days or even up to 10 days as in the region of Varanasi. The most common part of the festival is the use of colors or colorful waters which people put among each other, often accompanied with wishing each other a "Happy Holi". During the

festival not only social barriers are blurred, but also differences between male and female, some consider that this is based on the colors. Since people are heavily colored it is difficult to distinguish each from another. In India people rarely consume alcohol, this is different during the Holi festival, also other intoxicating substances such as the marihuana-based *Bhang* are consumed. In the bigger cities this, as it loosens social barriers and the use of new synthetic colors, leads to various issues.

Group members participating in the Holi festival

The color health issues

In the past most of the colors used were of a natural kind and plant based. Nowadays there are materials available that fulfill the same purpose – being colorful – but that are cheaper and/or easier to derive. These colors are often synthetic and considered toxic because they come with cheap ingredients like mica, acids alkaline and pieces of glass (KHAN, 2013). After the Holi season there can be observed many people, especially minors that have to deal with skin irritations triggered by the colors. This common issue was studied by Indian dermatologists and named "the 'holi' dermatoses" (GHOSH et al., 2009). Another concern is that these toxic colors do not only affect the people participating in the festival but also many of the animals that are roaming the Indian streets, such as stray dogs or cows. It was also observed that there is increasing fine dust pollution during the festival season and an increasing pollution of water bodies.

Group members participating in the Holi festival

The harassment issues

During the last years another aspect of the Holi festival gained some kind of sad popularity. Usually in the Indian society there are some invisible barriers between male and female citizens and interactions are more conservative then in our western society. But due to playful atmosphere during the festival, the usually strictly prevented contact between men and women and the ingestion of intoxicating substances, every year a variety of harassment is reported, from groping over to rape. As a consequence, women often try to avoid the mainly male crowds during the festival. Even if women step up against any harassment during Holi, it is often ignored, or neglected by males, who sometimes like to excuse themselves with the expression "*Buraa naa mano holi hain*!", which can be translated into "don't feel offended, its Holi". Two years ago, in 2017 the University of Delhi found no other possibility to provide security to its female students than to lock the women's dormitories on the campus during the Holi festival (SAFI, 2017).

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Participants

	Last Name	First Name	Report title
1	Appleby	Scott	Urban and peri-urban production of vegetables and traditional food - an option for slum dwellers?
2	Baucher	Rose	Leper in India: a public health challenge
3	Bauer	Jana	The Indian economy and the role of agriculture and forestry
4	Bebre	Ieva	Forests, nature conservation and tourism: past developments and present policies
5	Berg	Aino	The Hindu nationalism and its impact on non-Hindu livestock farmers
6	Bessert	Leon	Forests, nature conservation and tourism: past developments and present policies
7	El Nagi	Nadim	India: Geography, climate, and ecological zones
8	Fastner	Kira	Social-ecological systems and rural-urban transformations: the basic theory
9	Gerlach	Marcelo	Gandhi and the non-violence struggle for independence in justice
10	Graef	Hannah	India: Geography, climate, and ecological zones
11	Hansen	Fridtjof	Verghese Kurien and the cattle revolution in India
12	Havill	Annelise	Verghese Kurien and the cattle revolution in India
13	Hellwig	Imke	The Indian economy and the role of agriculture and forestry
14	Hemmler	Katharina	India's Green Revolution and today's wheat and rice cultivation
15	Hesse	Sophia	Vegetarianism – Veganism – Traditionalism: the Indian middle class and the revival of food cultures
16	Holz	Florian	Neru and the divide of the Indian subcontinent
17	Ibing	Maximilian	Urban and peri-urban production of vegetables and traditional food - an option for slum dwellers?
18	Junker	Charlotte	Gandhi and the non-violence struggle for independence in justice
19	Kröner	Karoline	Vegetarianism – Veganism – Traditionalism: the Indian middle class and the revival of food cultures
20	Kühling	Marlene	Today's government policies: internal affairs and the atomic policy
21	Mathieu	Marie Camille	Decent work in Indian agriculture: the examples of cotton, sugar cane and tea
22	Reger	Johanna	Neru and the divide of the Indian subcontinent
23	Reinhard-Kolempa	Marilena	The Hindu nationalism and its impact on non-Hindu livestock farmers
24	Rupieper	Li Kathrin Kaja	Today's government policies: internal affairs and the atomic policy
25	Schuler	Manuel	India's Green Revolution and today's wheat and rice cultivation
26	Schwenger	Yakima	Decent work in Indian agriculture: the examples of cotton, sugar cane and tea
27	Tepasse	Henri	Social-ecological systems and rural-urban transformations: the basic theory

Happy participants enjoying the multidimensional learning experience of the India Excursion 2019