

Petersburg  
**DIALOGUE**



Петербургский  
**ДИАЛОГ**



**ЗАСЕДАНИЕ РАБОЧЕЙ ГРУППЫ**  
**«ЭКОНОМИКА»**  
**ФОРУМА «ПЕТЕРБУРГСКИЙ ДИАЛОГ»**  
**«ОБЛИК УСТОЙЧИВОГО РАЗВИТИЯ»**

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# NEW GEOPOLITICAL REALITY. RUSSIA’S AND INDIA’S SUSTAINABLE DEVELOPMENT STRATEGIES

Dr. Andrey Nikolaevich  
Klepach

June 2024

VEB|RF

NEW GEOPOLITICAL REALITY.  
RUSSIA'S AND INDIA'S SUSTAINABLE  
DEVELOPMENT STRATEGIES

Andrey Klepach  
Chief Economist, VEB.RF

June 2024

Sustainable development in the context of global challenges

Russian-Indian relations successfully withstood the turbulence of a modern world. They are based on similarities in their civilizational values, proven friendship, mutual understanding, trust, common interests, proximity of approaches to fundamental issues of development and economic progress.

Among the 17 Sustainable Development Goals, only Goal No. 13 addresses the issue of climate change. The remaining SDGs are dedicated to combating poverty and hunger, as well as ensuring access to health care and education, reducing inequality, etc. The message to focus on the environmental aspect of the SDGs mainly comes from developed countries, while socio-economic problems are more important for developing countries. For Russia and India, the quality of life comes first – education, infrastructure, medicine, access to clean water, forest conservation, etc.

We strive for a comprehensive balanced smart development that combines the development of technology, the preservation of the people and nature with social justice and freedom. Russia's quantitative benchmark is to reach the level of well-being and quality of life in developed countries by 2040.

The time has come to formulate a new socially responsible business model: ecology - social responsibility - efficiency. Transformation of business social responsibility, ESG principles into a new model of development and public relations.



Sustainable development in the context of global challenges



Many experts find our current geopolitical situation unprecedentedly difficult and even dramatic. The question is how does the implementation of the UN's global goals relate to the splits in the modern world? Is sustainable development just declaration or a real transition in the life of modern society?



Sustainable development creates the necessary prerequisites for building a social contract between society and business, business and the state.



Is economic growth becoming sustainable and inclusive and is it focused on social well-being and human capital development?



Countries need cost-effective adaptation to climate change. An economy that is resistant to the challenges of the natural disasters. The economics of clean water and air. A balance between the development of economic activity and the conservation of biodiversity is needed.



The environmental agenda does not lose its relevance. But SDG's also encompasses issues other than climate change and clean energy.



Development institutions set standards for the quality of life. It is necessary to focus state support measures and the activities of development institutions on sustainable development and improving the quality of social capital.



In Russia, the priority area of the SDGs is people and social well-being, in developed countries – ecology and new energy.

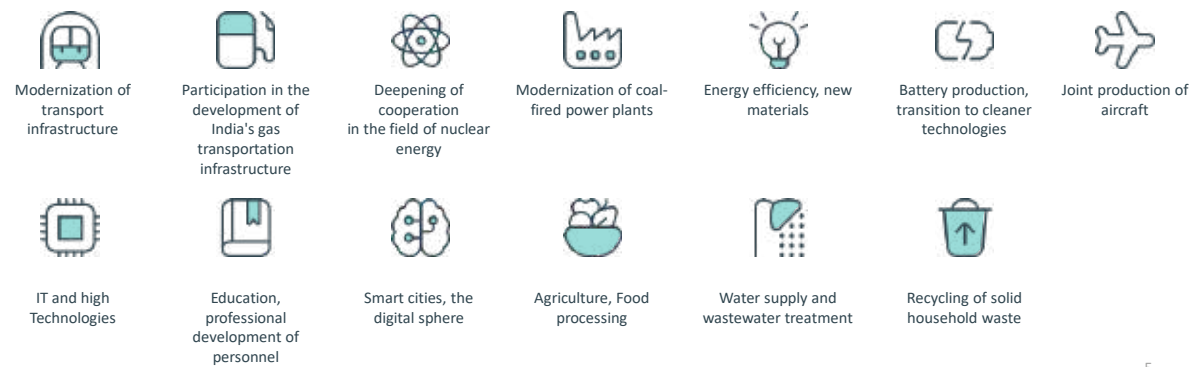
Sustainable development in the context of global challenges

All BRICS members see the SDG's «Education, gender and combating inequality" and "Health, well-being and Demography" as a priority where much more resources should be allocated.

Achieving the SDGs and other strategic goals			
SDG: 1-8,10,11	SDG: 12 – 15	SDG: 9 и 11	SDG: 9
<ul style="list-style-type: none"><li>Equality of opportunity and access to economic benefits</li><li>Personal growth of each person and employee</li><li>Honest relations with stakeholders</li></ul>	<ul style="list-style-type: none"><li>Environmental protection</li><li>Environmental safety</li><li>Rational use of natural resources</li><li>Meeting the needs of future generations</li></ul>	<ul style="list-style-type: none"><li>Creation of high-quality infrastructure</li><li>Openness</li><li>Availability</li><li>Security</li></ul>	<ul style="list-style-type: none"><li>Technological progress</li></ul>
Correlation of SDGs with economic growth factors			
Human capital	Natural capital	Physical capital	Technologies
<ul style="list-style-type: none"><li>Labor supply</li><li>Education</li><li>Discipline</li><li>Motivation</li></ul>	<ul style="list-style-type: none"><li>Earth</li><li>Natural resources</li><li>Favorable state of the environment</li></ul>	<ul style="list-style-type: none"><li>Equipment</li><li>Factories and plants</li><li>Roads</li></ul>	<ul style="list-style-type: none"><li>Science</li><li>Engineering</li><li>Management</li><li>Entrepreneurship</li></ul>
Financial development institutes			



## Perspective areas of cooperation



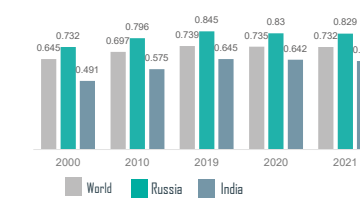
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## Human and social capital in modern conditions of high uncertainty and stress

Modern global uncertainty and stress create risks for human and social capital and negatively affect their quality

### Human capital

UN human development index



### Social capital

There is a process of loss of trust in the world: worldwide, less than 30% of people believe that most people can be trusted (the lowest figure in the entire history of observations)

### Sources of stress and uncertainty

1. Threats from environmental security: climate change, an increase in the number of natural disasters and catastrophes, a decrease in food security
2. Threats from economic security: increasing inequality, growing instability in employment, persistence of high unemployment
3. Threats from new technologies and digitalization: job cuts, deterioration of social ties, decreased cognitive skills, excess information and misinformation
4. Threats from epidemiological security: the emergence of new epidemics
5. Threats of political polarization: an increase in the number of conflicts between countries, an increase in violence (riots, protests) within states

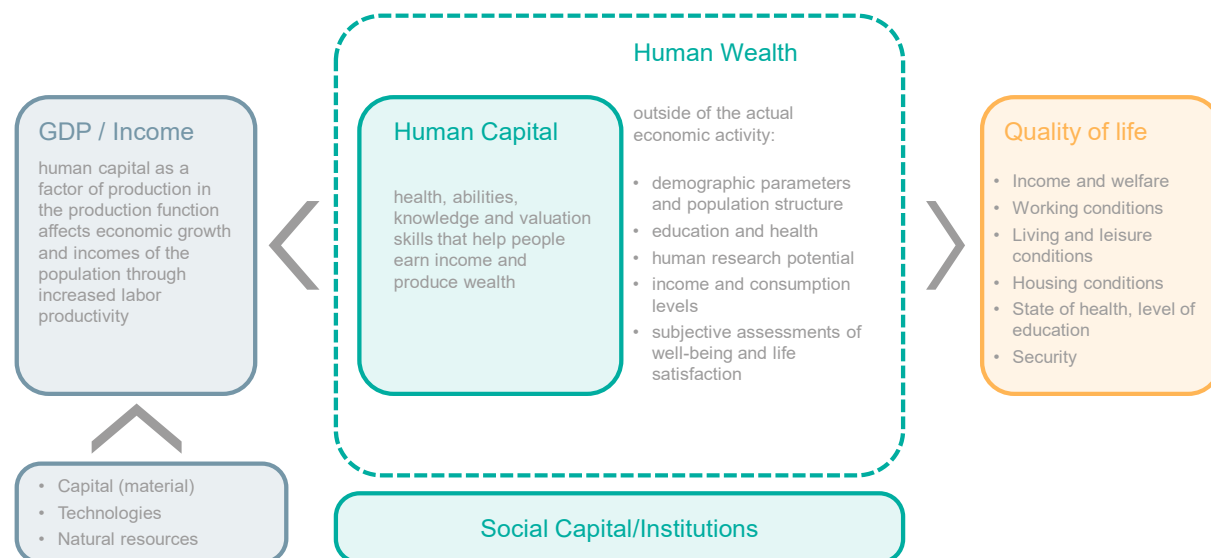
### What to do to relieve stress and uncertainty

1. Environmental safety: achieving carbon neutrality identification and assessment of environmental risks
2. Economic security: guaranteed equal access to quality education job creation
3. New technologies: ensuring compliance of personnel training with new market needs achieving technological sovereignty
4. Epidemiological safety: the growth of R&D expenditures in the field of medicine
5. Political security: timely achievement of national goals

Ignoring new stresses and uncertainties increases the crisis of trust in society and entails risks for the sustainable development of individual countries and the world community as a whole.

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## Far beyond just money. Human capital and human wellbeing as driver for development and quality of life




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## Potential measures to stimulate the development of human capital and improve the quality of life


- Reducing regional differentiation in terms of resource availability of sectors aimed at developing human capital and improving the quality of life.
- Reduction of differentiation in the level of remuneration of employees involved in the formation and development of human capital.
- Attracting specialists to regions and rural areas through the provision of preferential housing and land plots.
- An increase in capital investments in sectors that form human capital, an increase in the capital stock of medical workers and an increase in R&D expenditures in the field of medical sciences to a level corresponding to the level of developed countries.
- An increase in financing for the modernization of housing and communal services to solve the problem of dilapidated and emergency housing, wear and tear of engineering networks.

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Key areas of VEB.RF’s sustainable development efforts

**For the country**

**DEVELOPMENT INSTITUTION**  
  
Contribution towards the national development agenda  
  
Supporting sustainable projects and introducing ESG impact assessment for projects  
  
Providing financial and non-financial support for sustainable projects that contribute to the SDGs and national development goals  
  
Assessing the ESG impact of projects

**For the economy**

**METHODOLOGICAL CENTRE**  
  
Institutionalisation of sustainable development  
  
Developing the infrastructure of the responsible financing market  
  
Setting up the national system of financing for green, adaptational and social impact projects  
  
Introducing the ESG Declaration and partnering with Russian major organisations to promote ESG standards  
  
Harmonising the Russian ESG financing system and international standards and ensuring that the Russian system will be internationally recognised

**For VEB.RF**

**SOCIALLY AND ENVIRONMENTALLY**  
  
International recognition for the highest maturity level of sustainability  
  
Implementing sustainable development initiatives  
  
Introducing ESG best practices into VEB.RF’s activities  
  
Receiving the same recognition for VEB.RF’s high-quality sustainability practices (ESG ratings) as Russia’s largest state banks  
  
Cooperating with ESG-related organisations and associations

VEB.RF’s contribution towards the SDGs and national goals

Financing provided in 2018-2023 for investment projects contained in VEB.RF’s lending portfolio in proportion to their contribution towards the SDGs\* and national goals



\* Each investment project may correspond to more than one of the SDGs as analytically grouped by VEB institute

Key results of VEB.RF’s sustainable development efforts

<div>E</div> <div>S</div> <div>G</div>	Environmental	Approval was given to the taxonomies developed by VEB.RF for green, social and adaptational projects as part of its functions as the Methodological Centre responsible for promoting investment in sustainable (including green) development and attracting private investment in development projects in the Russian Federation.	Eco-friendly electric transport projects	VEB.RF’s Healthy Office concept aims to reduce resource consumption and optimise separate waste collection
	Social	In the 100 largest cities VEB.RF completed the training programme for management teams including top decision-makers to prepare plans and projects designed to help city dwellers to live a more convenient life	The programme launched by VEB.RF to set up new schools is expected to be the largest project in the country	Regions began to introduce IRIIS, Russia’s national infrastructure project assessment system developed by VEB.RF and aimed at achieving the Sustainable Development Goals
	Governance	VEB.RF approved the Strategy, which includes introducing the principles of sustainable development into VEB.RF’s activities	VEB.RF approved the Project Risk Insurance Standard, which includes social and environmental commitments	VEB.RF started its ESG transformation, which resulted in formulating VEB.RF’s ESG strategy

# WORLD CLIMATIC CRISIS, CHALLENGES AND SUSTAINABILITY TOWARDS URBAN ENVIRONMENT

Prof. Daya Shanker

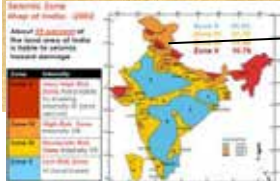
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE



## WORLD CLIMATIC CRISIS, CHALLENGES AND SUSTAINABILITY TOWARDS URBAN ENVIRONMENT

**Daya Shanker<sup>1</sup> & Vladimir Kulikove<sup>2</sup>**

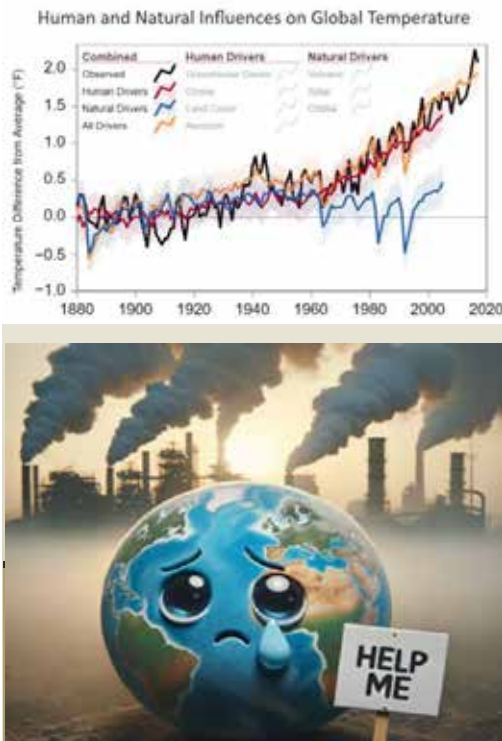
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 **Roorkee**



Russian-Indian Conference June 14<sup>th</sup>, 2024, Shimla (India) 1030-1200



### Climate Change is real and Mostly man Made

Since the Industrial Revolution, human activities have released **large amounts of carbon dioxide** and other **greenhouse gases** into the atmosphere, which has changed the **earth's climate**

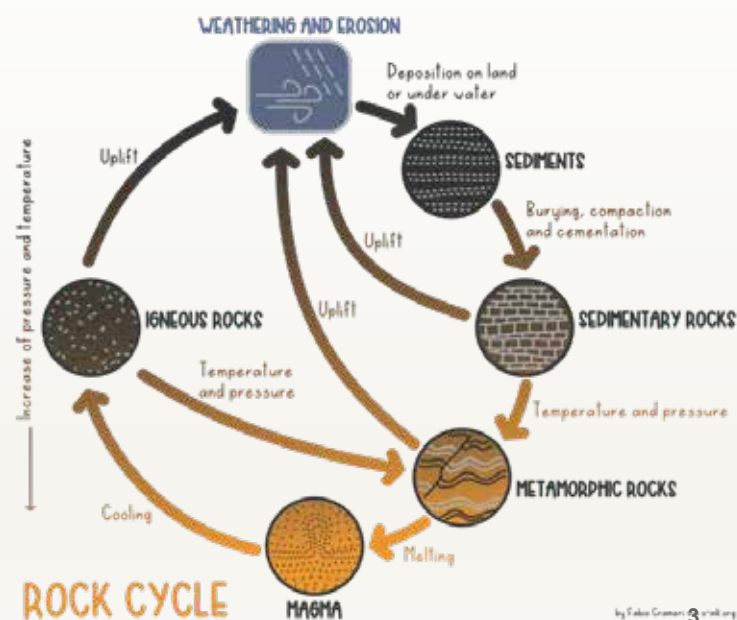
Natural processes, such as changes in the sun's energy and volcanic eruptions, also affect the earth's climate

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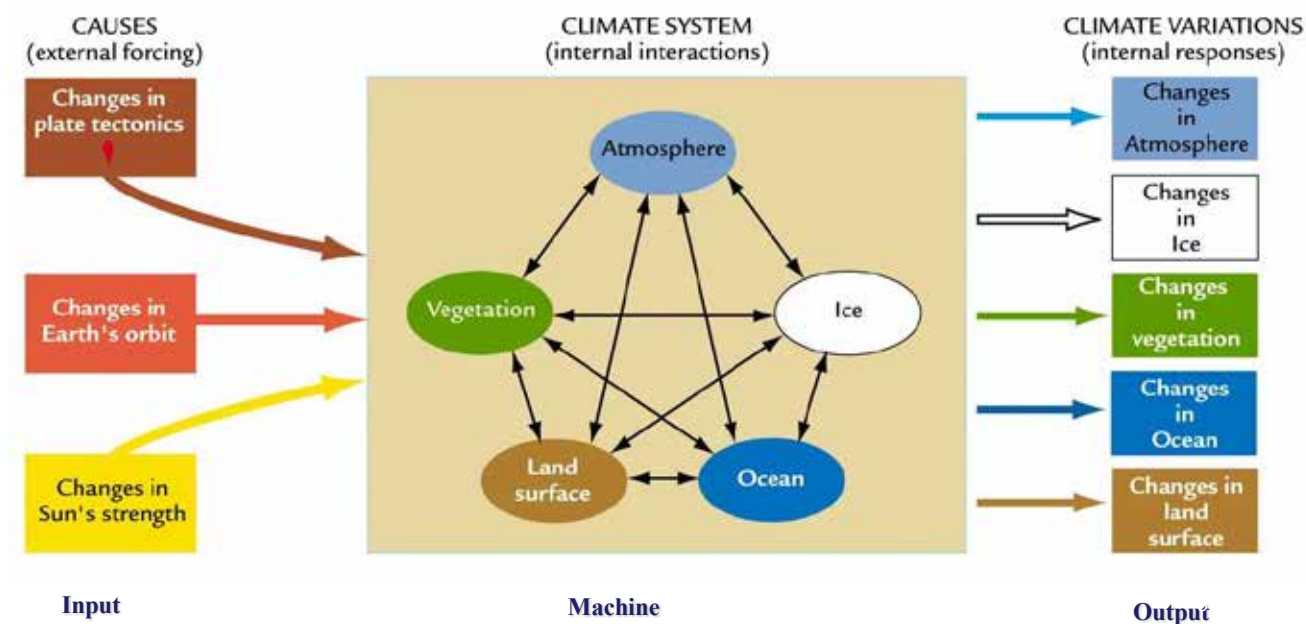


## Long-Term Climatic Changes

This fundamental principle organizes the **geologic materials and processes** which operate on Earth and other planets to produce igneous, metamorphic, and sedimentary rocks.

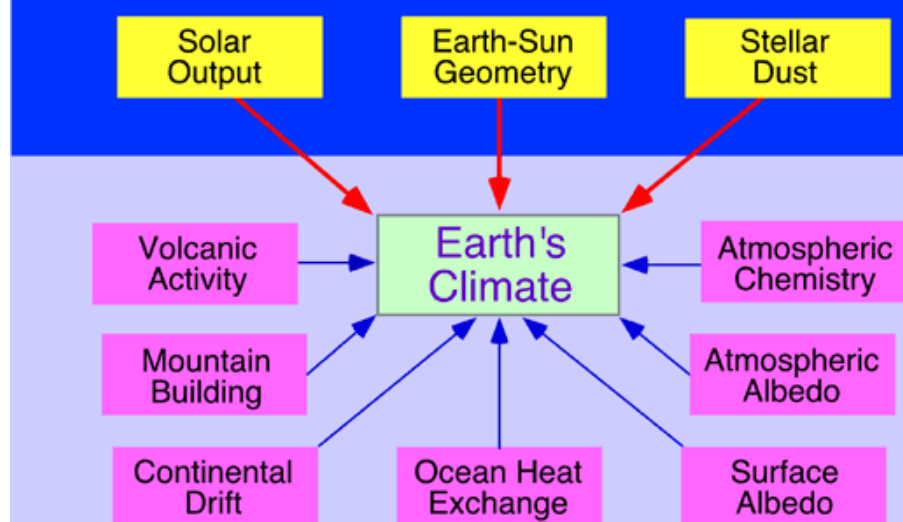


## Climate: Forcing and Response

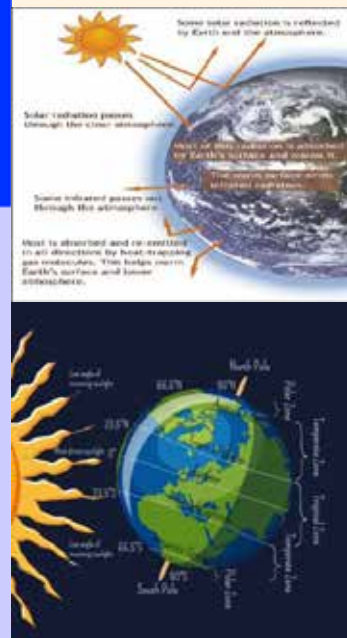


## Factors that influence the Earth's climate

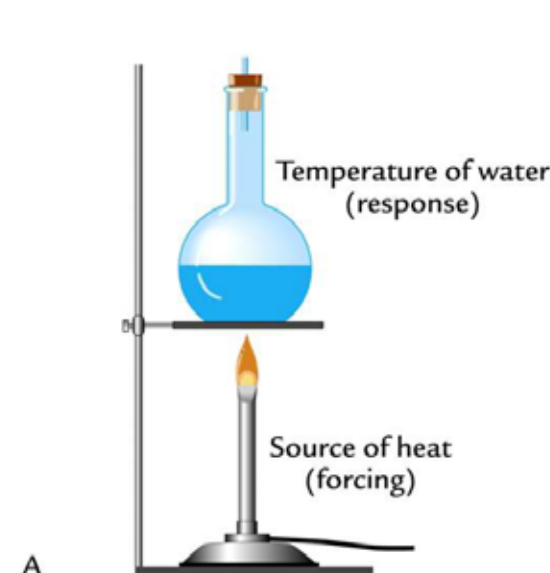
### Extraterrestrial Factors



### Ocean, Atmosphere, and Land Factors



## Forcing and Response: A Bunsen Burner Experiment



Three major kinds of climate forcing in nature:

- ✓ Tectonic processes
- ✓ Earth-orbital changes
- ✓ Changes in Sun's strength

- ✓ **Anthropogenic forcing**
  - ✓ Urbanization
  - ✓ Deforestation
  - ✓ Burning fossil fuels
  - ✓ Agriculture

Response time depends on "materials" or "components".

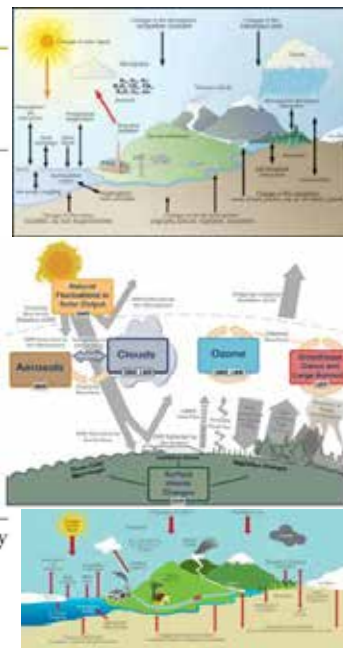
Natural

Man-Made

## Response Times of Various Climate

TABLE 1.1 Response Times of Various Climate System Components

Component	Response time (range)	Example
<b>Fast responses</b>		
Atmosphere	Hours to weeks	Daily heating and cooling Gradual buildup of heat wave
Land surface	Hours to months	Daily heating of upper ground surface Midwinter freezing and thawing
Ocean surface	Days to months	Afternoon heating of upper few feet Warmest beach temperatures late in summer
Vegetation	Hours to decades/centuries	Sudden leaf kill by frost Slow growth of trees to maturity
Sea ice	Weeks to years	Late-winter maximum extent Historical changes near Iceland
<b>Slow responses</b>		
Mountain glaciers	10–100 years	Widespread glacier retreat in 20th century
Deep ocean	100–1500 years	Time to replace world's deep water
Ice sheets	100–10,000 years	Advances/retreats of ice sheet margins Growth/decay of entire ice sheet



## Besides These, Plate Tectonic Generate Major Earthquakes & Volcanic Eruption

significant consequences, climate change including human and economic losses

The Impact of Earthquakes on **Human and Economic Losses.**

- Earthquakes can have significant consequences, including human and economic losses.
- Major earthquakes in the last 100 years have **caused significant damage, loss of life, and economic impact.**
- The built environment is particularly **vulnerable to earthquakes**, resulting in extensive economic losses.

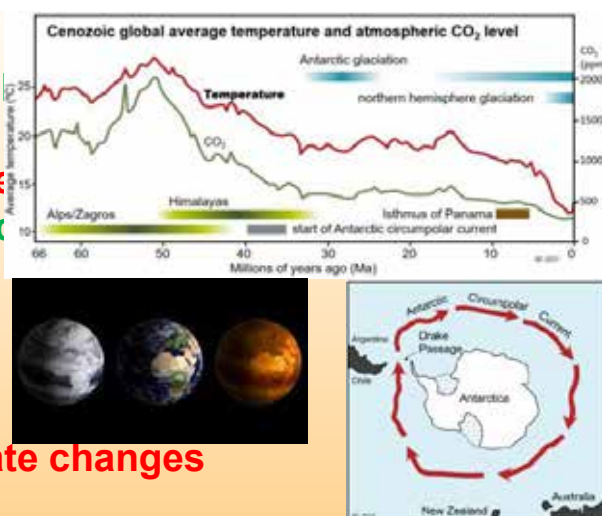


**Global climate change variables affecting long-term climate change**

- plate tectonics
- orbital variations (Milankovitch cycle)

**variables affecting short-term climate change**

- solar variations
- volcanic eruptions
- anthropogenic factor



## Role of Plate Tectonics in global Climate changes

- The movement of the plates also causes **volcanoes and mountains to form** and these can also contribute to a change in climate. **Large mountain chains can influence the circulation of air around the globe**, and consequently influence the climate. For example, warm air may be deflected to cooler regions by mountains.
- The movement of plates can change the characteristics of ocean basins, and that can change ocean currents, and therefore, the climate.

## Examples of Earthquake Impacts on **Gross Domestic Product (GDP)**

Event	Economic Losses (Billions)	GDP (Billions) of GDP	Percentage of GDP	Consequences
1950 Mw 8.6 Earthquake (India)	0.005 (5 million)	₹52	0.0096%	When economic losses exceed the GDP of a country, it can have severe consequences.
2001 Bhuj Earthquake (India)	\$5	\$476.5	1.05%	Result in a prolonged economic crisis; High unemployment rates; significant decreases in living standards.
2010 Haiti Earthquake	\$7.8	\$6.5	120%	The recovery process can be slow and difficult, with many people struggling to rebuild their lives.
2015 Nepal Earthquake	\$10	\$19.92	50.2%	
2011 Japan Earthquake and Tsunami	\$235	\$5,874	4%	It is important to invest in earthquake preparedness and risk reduction measures to minimize the economic impact of future earthquakes.



## Consequences--affected population

- When the economic losses from an earthquake exceed the GDP of a country, it can have severe consequences for the affected population.

- Result in a **prolonged economic crisis**.
- High **unemployment rates**.
- Significant **decreases in living standards**.
- The **recovery process can be slow and difficult**, with many people struggling to rebuild their lives.
- Government and international aid** may be necessary to help the affected population recover from the economic impact of the earthquake.

It is **important** for **countries** to invest in earthquake preparedness and risk reduction measures to minimize the economic impact of future earthquakes.

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## Human Activities (**URBAN**) and Climatic Changes

- Urban Heat Island Effect:** Warmer Cities—**abundance of buildings, concrete surfaces, and lack of green spaces**
- health problems, increased energy consumption for cooling, and worsening air quality**

**Air Pollution:** Urban areas source of major air pollution—vehicles, industry, and buildings emitting harmful pollutants like particulate matter, nitrogen oxides, and volatile organic compounds—impact in human and environment

**Waste Management:** Cities generate large amounts of waste, including plastic, electronic waste, and food waste.

**Water Scarcity:** Urbanization can strain water resources, leading to water scarcity and pollution. Sustainable water management practices, such as rainwater harvesting and water recycling, are essential to ensure water security in urban areas.

**Loss of Biodiversity:** Urbanization often leads to the destruction of natural habitats, resulting in the loss of biodiversity. It is important to incorporate green spaces, parks, and wildlife corridors into urban planning to support biodiversity and ecosystem services.

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## Why any estimate of the cost of climate change will be flawed?

Temperature fluctuations are unpredictable. Humans are even more so

- When **William Nordhaus**, who would later win a **Nobel prize in economics**, modelled the interaction between the **economy and the atmosphere** he represented the “**damage function**”—an estimate of harm done by an extra unit of warming—as a wiggly line
- because it is not a straight line but rather a curve that may fluctuate depending on various factors.**

3°C rise in temperature

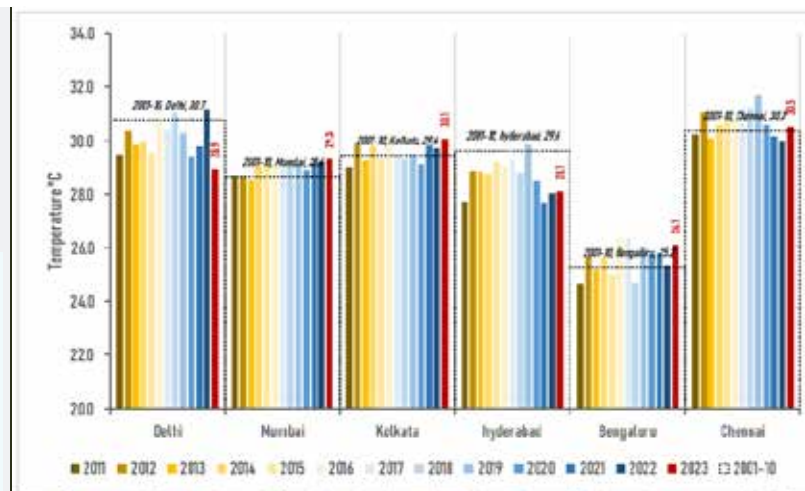
1-2% of global GDP would be lost (1991)



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## Urban heat island effect

The study's definition of summer is the period from March to August.



**Fig:** Trend in summertime seasonal average ambient temperature among megacities

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## Sustainability in Urban Environments

It is important to take proactive measures such as:

- Implementing sustainable urban planning and design practices that prioritize smart growth, mixed land use, and public transportation to reduce carbon emissions and promote walkability.
- Investing in renewable energy sources such as solar and wind power to reduce dependence on fossil fuels and mitigate climate change.
- Promoting sustainable transportation options such as cycling, walking, and public transit to reduce traffic congestion, air pollution, and carbon emissions.
- Enhancing green infrastructure and urban forestry to improve air quality, reduce urban heat island effects, and provide ecosystem services.
- Encouraging community participation and engagement in sustainability initiatives through education, awareness campaigns, and partnerships with local stakeholders.

However, tree plantation is another way to tackle these problems-----withstand air and water pollution, as well as heat

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## Role of International cooperation

International cooperation is crucial in addressing the climate crisis, challenges, and promoting urban sustainability for several reasons.

**Shared responsibility:** climate crisis is a global issue that requires a collective effort to address

**Information sharing and best practices:** sustainable urban planning, renewable energy solutions, and climate adaptation strategies

**Financial support:** can provide financial support to developing countries support can include grants, loans, and technical assistance to build resilience and reduce emissions.

**Diplomatic Friendly Pressure:** help to hold countries accountable for their climate commitments and take meaningful action on climate change.

**Technology transfer:** can facilitate the transfer of clean technologies and innovation between countries

Russia-India dialogues Conference on June 14, 2024 at Shimla, India can play a significant role in tackling the climate crisis, addressing challenges, and promoting urban sustainability through deliberations, collaboration and partnership in various ways:

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## Mutual Values of Russia-India Dialogues

- **Exchange of knowledge and expertise:** both countries can enhance their respective efforts to combat climate change and promote sustainable development.
- **Joint research and innovation:** Collaboration in research and innovation can lead to the development of new technologies and solutions that can help mitigate the impacts of climate change and foster sustainable urban development. By pooling their resources and expertise, Russia and India can accelerate progress towards a more sustainable future.
- **Investment in clean energy projects:** can collaborate on investment in clean energy projects such as solar, wind, and hydropower; both countries can reduce their carbon emissions, improve energy security, and create green jobs.
- **Enhancing climate resilience:** Russia and India can work together to enhance climate resilience in urban areas by sharing lessons learned from climate adaptation projects and disaster risk reduction efforts. By promoting resilient infrastructure and urban planning practices, both countries can better prepare for the impacts of climate change.
- **Advocacy and diplomacy:** . By speaking with a unified voice, both countries can amplify their impact on climate policy at the international level to promote sustainable urban development goals, and advocate for the needs of developing countries

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## Mutual and Bilateral Talks solve the world problems

### The Limitations of India and Russia's Transactional Relationship

Since tough time in February 2022, it might seem as though ties between India and Russia have strengthened. While much of the West isolated Russia, India-Russia energy trade spiked, and India made efforts to accommodate Russia on the world stage. The two countries have also had visible public exchanges, such as a mid-January phone call between Indian Prime Minister Narendra Modi and Russian President Vladimir Putin and Indian External Affairs Minister S. Jaishankar's trip to Moscow at the end of 2023.



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## Acceptance

A scientific consensus is not proof for a scientific theory but that it's the result of converging lines of evidence all pointing to the same conclusion.



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## Adaptation

Equitable Climate (**maritime climate**) Adaptation for Coastal Communities

Climate adaptation expert Nadia Seeteram, a Climate School postdoctoral research scientist, studies how sea-level rise affects coastal communities. She is especially interested in how climate risks are impacting housing infrastructure and housing needs.



Uncovering the Mysteries of Greenland's Melting Ice Sheets

Marco Tedesco, a polar scientist at the Lamont-Doherty Earth Observatory, uses remote sensing data from satellites and

drones to reveal the processes behind the melting of Greenland's ice sheets, currently one of the biggest contributors to sea-level rise.

## Daviations

Climate Change  
The Future of Sustainability –  
Gap between rhetoric and reality

feasibility,  
Sustainability  
and effectiveness of alternative models of  
international socio-economic  
development, the world order  
and the interaction of value narratives.



pollution produced by wildfires

pollution in Cities



## Science & Humanity

GEOSCIENCE FOR THE  
BENEFIT OF HUMANITY  
AND THE PLANET



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## Water-Life for All

Water supply must  
be **affordable**.

Only then can it be  
**sustainable**

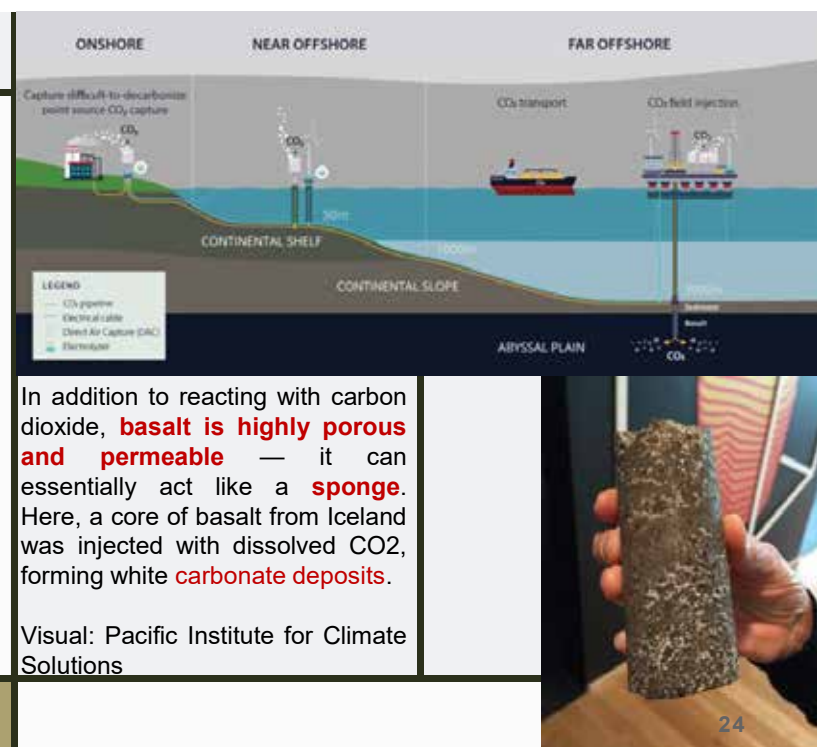


## Carbon Capturing

### Scientists Plot a Sub-Ocean Tomb

Solid Carbon is developing technology that aims to **turn carbon dioxide into rock by extracting it from the atmosphere and injecting it into the seafloor**. Several options exist, from capturing emissions at onshore plants that produce high emissions, to directly capturing CO<sub>2</sub> from the atmosphere, which could be powered by wind turbines.

Visual: Ocean Networks Canada



**IITR: 175 years**

Collaboration Readiness

- IITs are autonomous public institutes of higher education
- Governed by the Institutes of Technology Act, 1961 which has declared them as institutions of national importance

**Origin: 1847**

**Govt of India Celebrated 175 Years of IIT Roorkee by releasing commemorative Coins & Stamps**

- 365 Acres of verdurous campus close to the Himalayas.**
- Satellite campuses: Greater Noida (NCR) and Saharanpur**
- Extensive sports facilities and clubs for co-curricular activities.**

**QS WORLD UNIVERSITY RANKINGS** 369 (#6 in India)

## Conclusions

- The whole world is threatened by climate change but **developing countries are often hit the hardest**.
- **International cooperation** without any cost of reservation can solve the Climatic problems, Urban sustainability and **achieving UN Sustainable Development Goals (SDGs)**
- Today we have UN, G8, G20, WTO, EU, APEC, APRU, BRICS and so on, **but are we ready to produce adequate global answers?— NO! (NEEDED)**
- Climate Change -The **Future of Sustainability** — Gap between **rhetoric and reality** (politics, business, or personal relationships- Leads to disappointment, distrust, and disillusionment)
- **Russia-India dialogues** have the potential to significantly contribute to tackling the climate crisis, urban sustainability through scientific and



# FOCUS ON SUSTAINABLE DEVELOPMENT. OPPORTUNITIES AND CHALLENGES FOR RUSSIA- INDIACOOPERATION.

Dr. Lydia Kulik





## India's sensitivity to climate risks



India is one of the countries for which the negative effects of climate change are **most detrimental** (7th place in the Global Climate Risk Index in 2021).

**Almost 85% of India's territory is within the zone of certain climate risks.**

- country's dependence on the agricultural sector
- large number of low-income rural population
- floods, droughts, cyclones, extreme precipitation, changes in monsoons
- coastline, island territories
- melting glaciers are a source of drinking water for hundreds of millions of people and severe water shortage, including ground water
- extreme temperatures (600 million people affected)
- vector-borne diseases
- a threat not only to food security, but also to exports
- India's GDP losses due to climate change could range from 3 to 10% by 2100.



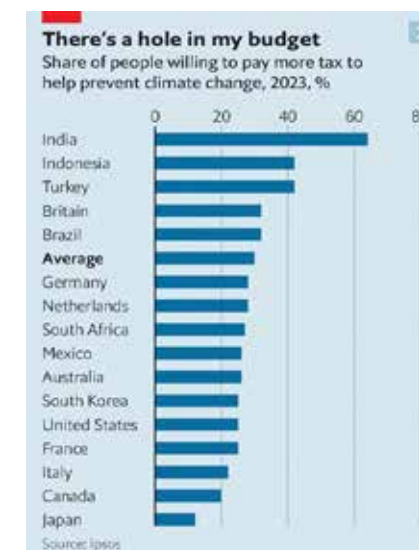
## Environmental concerns are shared by most people of India



1972: UN Conference "Human Environment" in Stockholm - the initiative of Olaf Palme and Indira Gandhi.

**Renewable energy and the environment is one of the personal priorities of Prime Minister N. Modi.**

A number of initiatives have been adopted, implemented under patronage of N. Modi.



## India's policies in the energy sector, urban development, waste management - will shape up the future of global environment



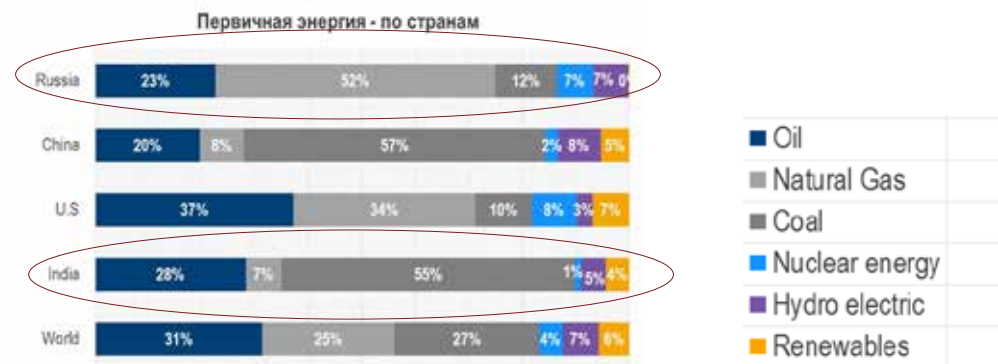
Along with the USA and China, India is one of the three largest emitters of greenhouse gases. If we take into account the combined emissions of the entire European Union, India will be in fourth place. **Emissions per capita are rising, but are significantly below the global average of 2.4 tCO<sub>2</sub>e (6.3 tCO<sub>2</sub>e - world).**

**It is the energy policies of India and China that will determine the dynamics of CO<sub>2</sub> levels on a global scale in the near future.** Despite some successes, India remains one of the major unknowns in the equation for the global effort to reduce emissions.

India is the 3rd largest consumer of primary energy in the world after China and the USA (5.7%). **India's total primary energy demand is expected to grow by 63% by 2030**, and India's share of global primary energy demand is expected to rise to 9.1% (from 6.4% in 2017).

**The IEA estimates that nearly 60% of India's greenhouse gas emissions by the end of the 2030s. will come from factories, vehicles, buildings and power plants that have yet to be built.**

## India's unique primary energy mix



- The energy balance is dominated by coal and oil (83%)
- India strives for a more balanced combination
- Gas in India accounts for just about 7% at present (the world average is 25%). India aims to increase the share of gas in the energy basket to 15% by 2030. India also aims to increase the share of renewable energy sources (including nuclear energy).
- In the Union Budget 2023-2024: 4,2 bln USD allocation for energy transition (via Ministry of Petroleum and Natural Gas)

## India's governmental strategy in energy policy

- ✓ Energy security
- ✓ Uninterrupted supply of affordable and sustainable energy to all citizens
- ✓ The transformation of the country's energy system required for these goals

INDIA IS BELIEVED to have already succeeded in decoupling its GDP growth rate from its emissions growth rate.

December 2023: The Indian Minister of Power and Renewable Energy Mr R.K. Singh stated that non-fossil fuel sources account for about 44% of India's electricity generation capacity.

While all models show that the country will not be able to avoid rising emissions until 2050,

there is an understanding that industrialisation and urbanisation in India should follow a low-carbon scenario.

## Cities will matter most

India will have 68 cities with population over 1 million by 2030, up from 42 such cities currently.

Cities already matter to India. By 2008, an estimated 340 million people already lived in urban India, representing nearly 30 percent of the total population. Over the next 20 years, urban India will create 70 percent of all new jobs in India and these urban jobs will be twice as productive as equivalent jobs in the rural sector.

As a consequence, MGI projects that the population of India's cities will increase from 340 million in 2008 to 590 million by 2030—40 percent of India's total population (Exhibit 1). In short, we will witness over the next 20 years an urban transformation the scale and speed of which has not happened anywhere in the world except in China.

Urbanization will spread out across India, impacting almost every state. For the first time in India's history, the nation will have five large states (Tamil Nadu, Gujarat, Maharashtra, Karnataka, and Punjab) that will have more of their population living in cities than in villages.

Currently Russia: 75% urban, 25% rural.  
Currently India: 68,8% rural, 31,2% urban.

Five states are likely to be more than 50 percent urbanized



Water supply, sewage, solid waste, vehicles, public transport, affordable housing – the most pressing issues.

## India's initiatives around climate change

Together with France, India initiated the creation of the **International Solar Energy Alliance in 2016**. Headquarters in Gurgaon (a suburb of Delhi). 98 countries.

Participated in establishment of:

- ✓ Group of leaders for industrial transition (initiators – companies from India and Sweden, PPP).
- ✓ Coalition for Disaster Resilient Infrastructure.

India Cooling Action Plan.

Swachh Bharat Campaign (2014).

Green Bonds introduced in Union Budget 2022-2023.

Long term strategy for low carbon economic development unveiled (2022).

Electric vehicles and batteries promotion programme FAME.

LIFE – Lifestyle for environment. Decoupling of economic development from environmental degradation.

National Hydrogen Mission – aim of production of 5 mln ton of green hydrogen by 2030.

Ban of single-use plastic. Increasing forest area.

A course towards increasing energy efficiency and combating transmission losses.





## Glasgow 2021: Panchamrit



**At the Glasgow summit** in November 2021, **N. Modi presented a new 5-point plan for India (Panchamrit):**

1. India will achieve net carbon neutrality by 2070 at the latest;
2. India plans to generate 500 GW of electricity from non-fossil sources by 2030 (50 GW more than previous commitments);
3. 50% of electricity in India will be generated from renewable sources by 2030;
4. India also commits to reducing its greenhouse gas emissions by 1 billion tons by 2030 (estimated emissions would be 4.48 billion tons in the business as usual scenario, and 3.48 billion tons after the reduction, i.e. 2.31 tons per capita by 2030).
5. India plans to reduce the carbon intensity of India's GDP by 45% by 2030 compared to 2005 (earlier commitment was 33-35%).

**At the same time, international financing is the most important condition for India to achieve these goals.**

In Glasgow, N. Modi said that developed countries should provide at least \$1 trillion to implement the climate agenda of developing countries and the states most vulnerable to the climate threat.

## Russian – Indian approach to climate agenda



In many ways, the positions of India and Russia regarding the international climate agenda coincide.

While declaring its commitment to net carbon neutrality by 2060, **Russia says that this achievement can only be possible in the absence of sanctions and bans on the supply of equipment.**

**India makes its goals dependent on financial support from developed countries.**

**Both Russia and India recognize common but differentiated responsibilities and corresponding opportunities** in relation to climate change, and state the importance of gradual reforms taking into account the specifics of each individual country, while abrupt actions can lead to the opposite effect.

**Both countries advocate a sectoral approach to the necessary changes.**

They plan to use the global climate agenda to modernize their industry; they see an opportunity to transform the economy as a whole, solve pressing problems, and improve the quality of life of their people. They are starting with pilot projects (Sakhalin, Gujarat).

At the same time, Russia needs to take into account the growing trends in India and propose cooperation in the areas of India's interests.

**ESG regulation** is currently important for large public Indian companies, but we recommend that all Russian companies closely follow the developments and integrate this agenda into their activities in India.

## Russia's national priority projects (financing as in 2024)



- "Demography" - 890 billion rubles.
- "Safe and high-quality roads" - 621 billion rubles.
- "Healthcare" - 284 billion rubles.
- "Education" - 237 billion rubles.
- "Science and Universities" - 160 billion rubles.
- "Digital economy" — 141 billion rubles.
- "International cooperation and export" - 138 billion rubles.
- "Housing and urban environment" - 123 billion rubles.
- "Comprehensive plan for the modernization and expansion of the main infrastructure" - 120 billion rubles.
- "Ecology / Environment" - 78 billion rubles.**
- "Small and medium-sized enterprises" - 68 billion rubles.
- "Culture" - 52 billion rubles.
- "Unmanned aircraft systems" - 46 billion rubles.
- "Tourism and hospitality industry" - 44 billion rubles.
- "Labor productivity" - 5 billion rubles.

## Russia-India trade under new circumstances



**2023 calendar year**  
(India's data)

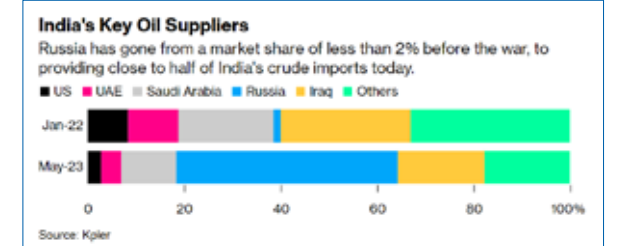
**\$60,9 bln**  
Russia's export

**\$4,1 bln**  
Russia's import

**\$65 bln**  
Trade turnover

**3 - 4 rank**  
Among India's trade partners  
(2021 r. – 25<sup>th</sup> rank)

- The main driver of Russian-Indian trade and investment is energy cooperation (oil, gas, coal, as well as fertilizers, vegetable oils).
- In 2022, Russia became the largest supplier of crude oil to India, displacing Iraq, Saudi Arabia from the first place.
- Russia became one of the top three suppliers of coking coal to India.
- Up to 20% of India's exports of petroleum products are now from Russian raw materials.
- Fertilizer shipments from Russia to India have grown 8 times.
- India is the number one supplier of medicines to Russia.



**Exports from India to Russia (Jan-Nov 2023):**

- Pharmaceuticals: \$311 mln
- Steel: \$209 mln
- Corundum: \$149 mln
- Shrimp: \$137 mln
- Ceramics: \$108 mln

**India's imports from Russia (Jan-Nov 2023):**

- Petroleum: \$41 bln
- Petroleum products: \$4.3 bln
- Coal: \$3.8 bln
- Fertilizers: \$ 2.2 bln
- Diamonds: \$1 bln

## Growing number of Russian companies coming to work in India



## Other potential areas of cooperation



- ✓ Energy efficiency, new materials
- ✓ Production of batteries and supply of nickel, copper, cobalt, lithium and other rare and non-ferrous metals necessary for the transition to cleaner technologies



- ✓ Modernization of coal-fired power plants
- ✓ Continuation of cooperation in the field of nuclear energy



- ✓ Expanding cooperation in the Arctic region
- ✓ Smart cities, data science
- ✓ Water supply and wastewater treatment systems
- ✓ Solid waste processing
- ✓ Environmental monitoring and analysis
- ✓ Modernization of coal-fired power plants
- ✓ Distributed energy technologies. Flexible and smart power grids (for smart management of distributed generation, demand, including from electric transport, energy efficiency management, microgrids)



- ✓ Battery production
- ✓ New materials and advanced technologies related to energy efficiency
- ✓ Production of inexpensive and efficient solar panels
- ✓ Eco-friendly packaging
- ✓ Development of energy efficient cooling systems
- ✓ Digitalization of production, transport systems, and public utilities.

## Gas infrastructure and nuclear energy (besides oil, coal supplies)

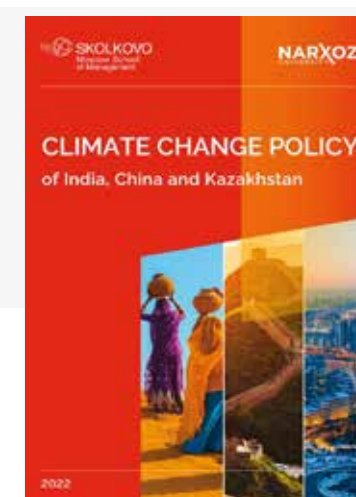
- ✓ Oil, coal and gas will maintain importance in the fuel and energy sector of India at least in the next 30 years.

- ✓ Continuation of cooperation in the field of nuclear energy.
- ✓ Expanding cooperation in the Arctic region.

### In gas transportation infrastructure development:

- ✓ supply of equipment for LNG bottling and processing, including ISO containers
- ✓ production of equipment, compressors, gas stations, pipeline equipment and meters
- ✓ production of CNG vehicles
- ✓ exchange of experience in the field of main pipeline infrastructure, LNG terminals, urban gas distribution, hydrogen use
- ✓ production of LNG ships in India and Russia

## Research Report 2022 (in English and Russian)





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**Expert of the Russian International Affairs Council, Valdai Discussion Club and the National BRICS Research Committee.**

**Senior Research Fellow, Center for Indian Studies, Institute of Oriental Studies, Russian Academy of Sciences.**

An experienced professional and scholar with a successful track record in both academic research and international business development, with a particular focus on India.

Has a unique combination of experience in both the private and public sectors. Lydia has worked in various positions in countries with rapidly developing economies.

She lived and worked in India for more than 10 years in a well-known Indian investment company. She is now consulting Russian and Indian companies on their international strategy.

Author and editor of research reports and monographs: "Digitalization of India. From a local phenomenon to a factor of global influence", "Meet the new Indian consumer", "Climate policy of India, China, Kazakhstan", "Narendra Modi - the leader of modern India", "India and Britain in the mirror of bilateral relations. History and modernity", etc.

Lydia graduated from MGIMO (U) under the Ministry of Foreign Affairs of the Russian Federation, where she also defended her PhD thesis. She holds an MBA degree from the Moscow School of Management SKOLKOVO.

She also studied management and international relations at The Wharton School, King's College London and the Indian School of Business (ISB).

Lydia speaks English and Hindi.

# EXTREME CLIMATE IMPACT ON URBAN POPULATION OF INDIA AND RUSSIA: POLICIES, PROGRAMS AND SUSTAINABLE ACTION

Sumant Swain



# Extreme Climate Impact on Urban Population of India and Russia: Policies, programs and sustainable action

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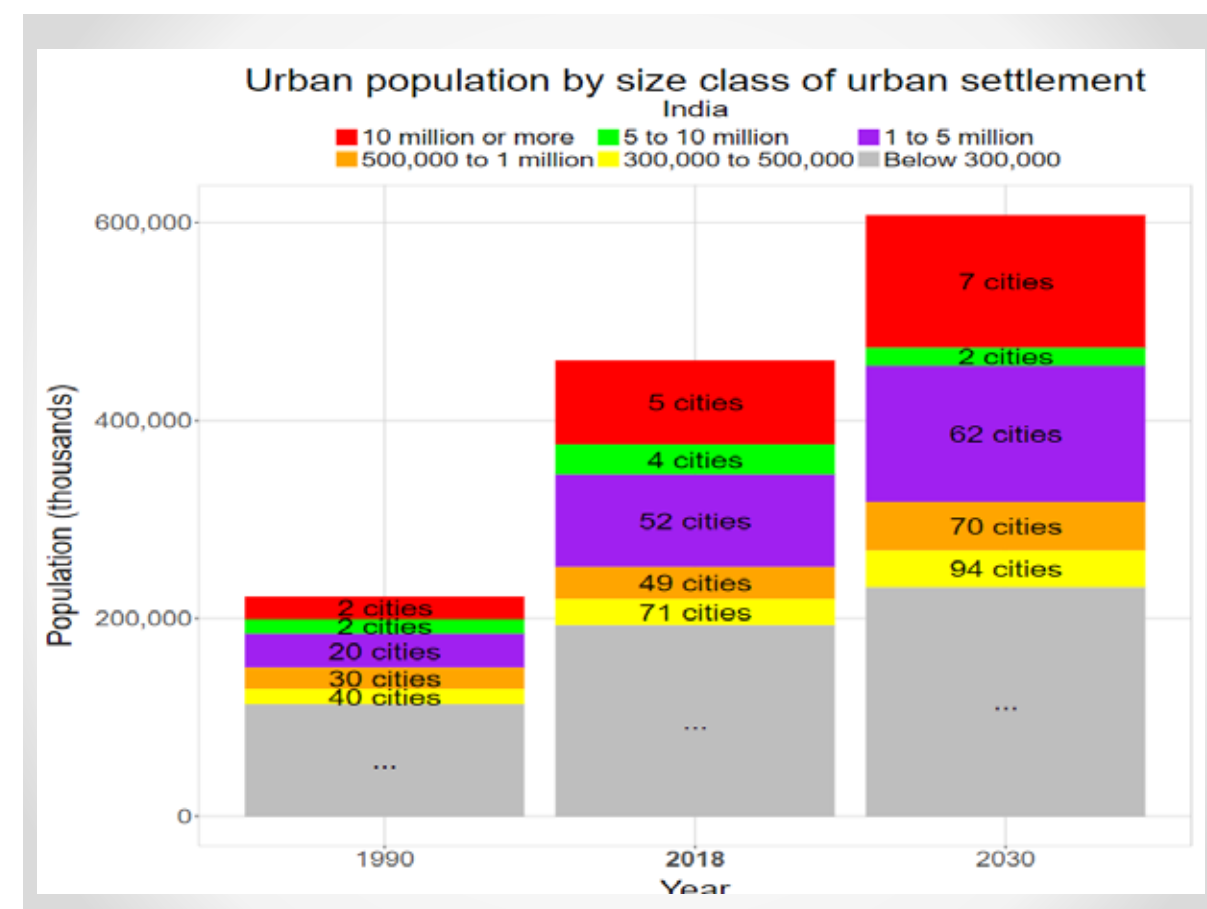


Figure 1.1: Level of Urbanisation, 2011-36

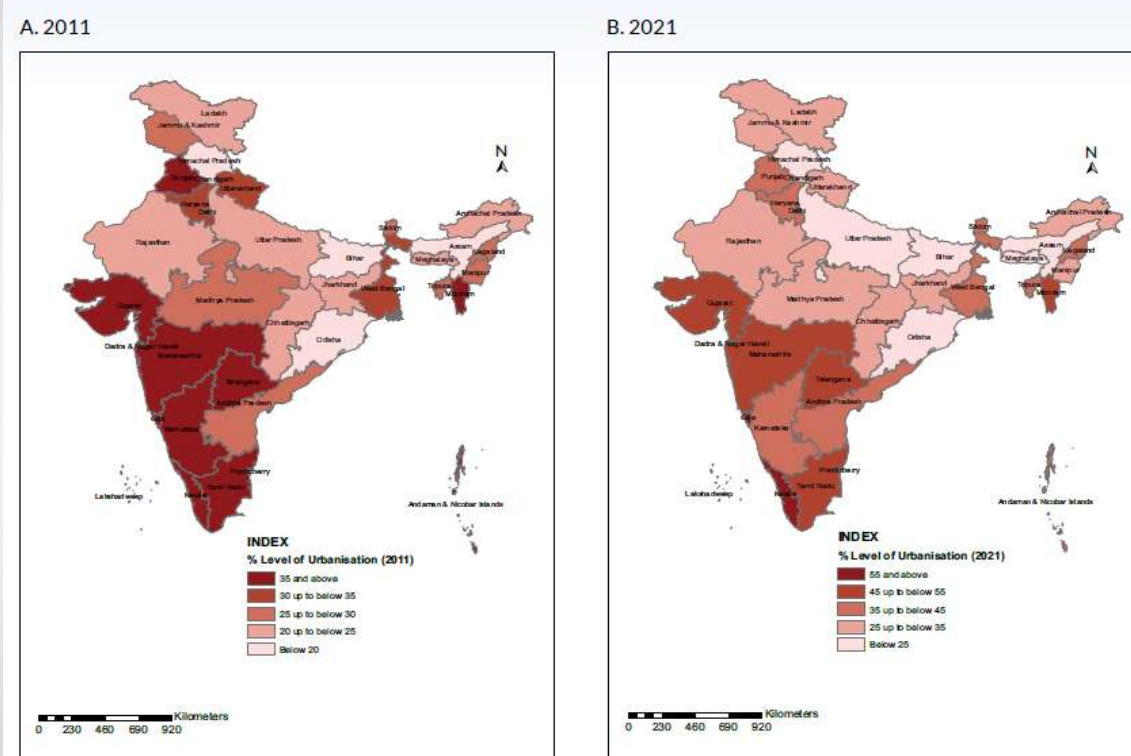
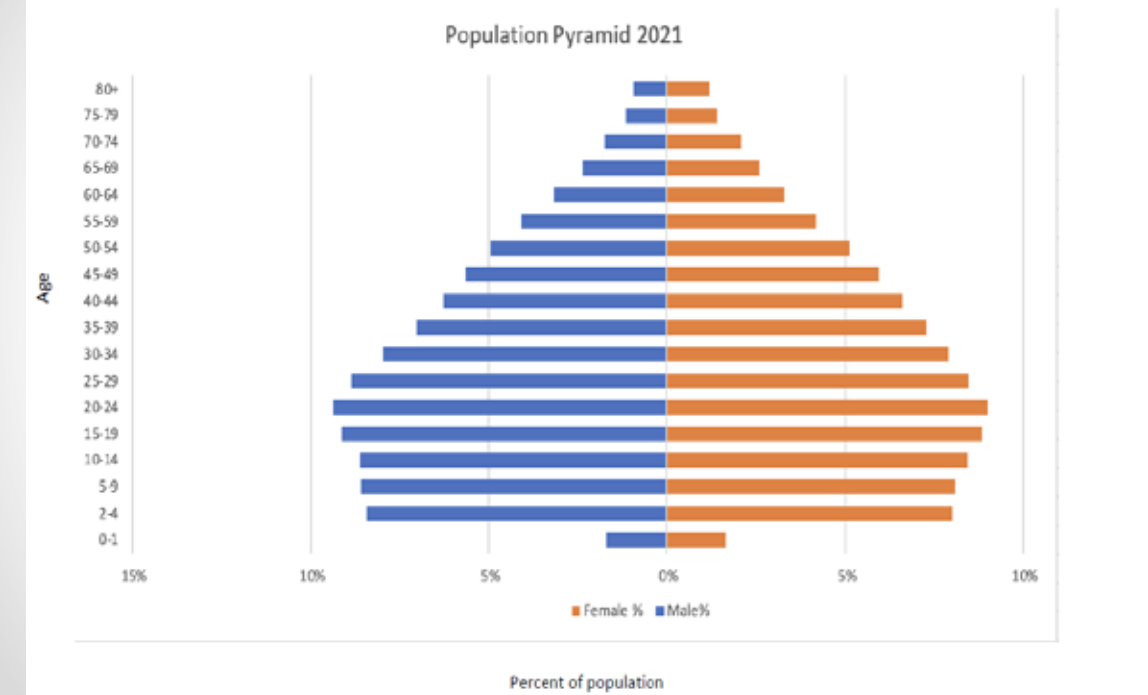
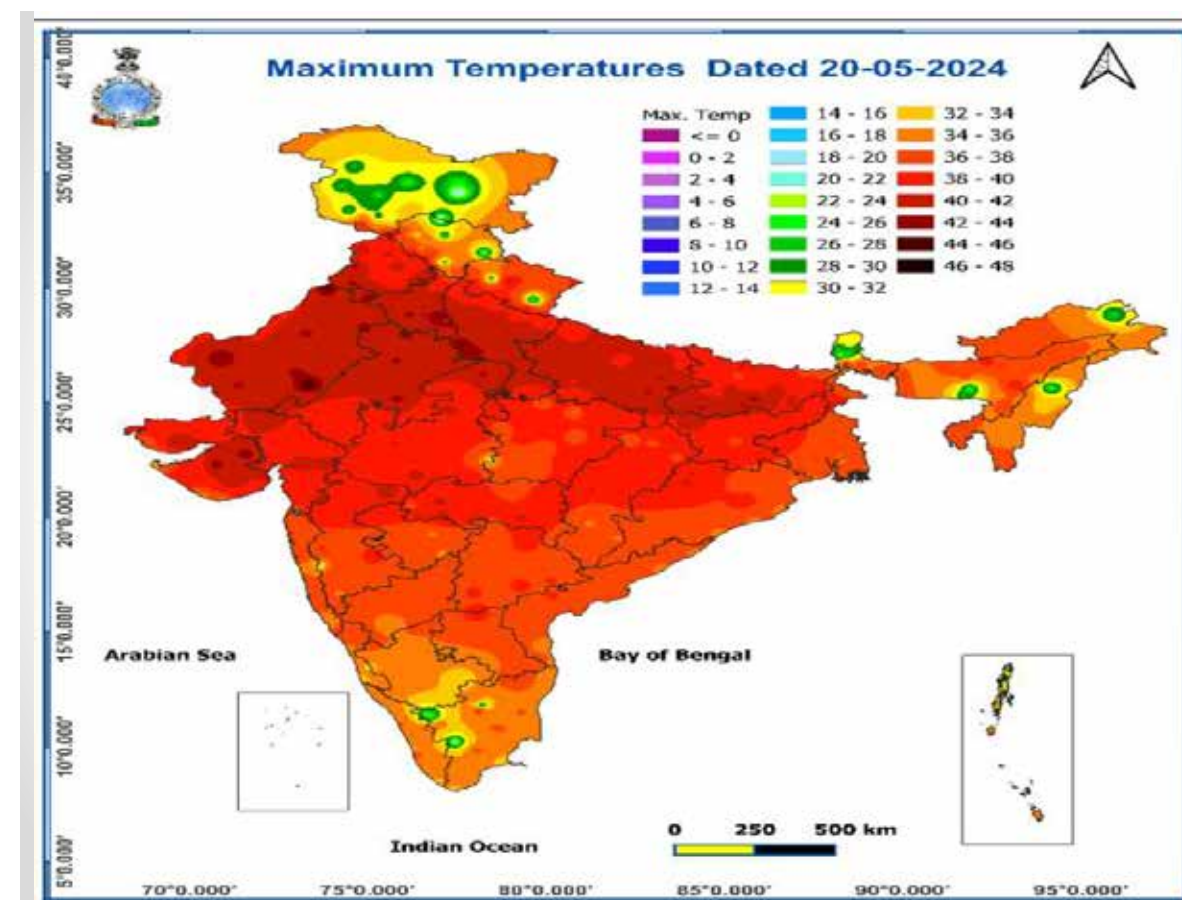


Fig. 1 & Fig. 2: Age-wise urban population projections for 2021 and 2031 for India



# Urban Demography

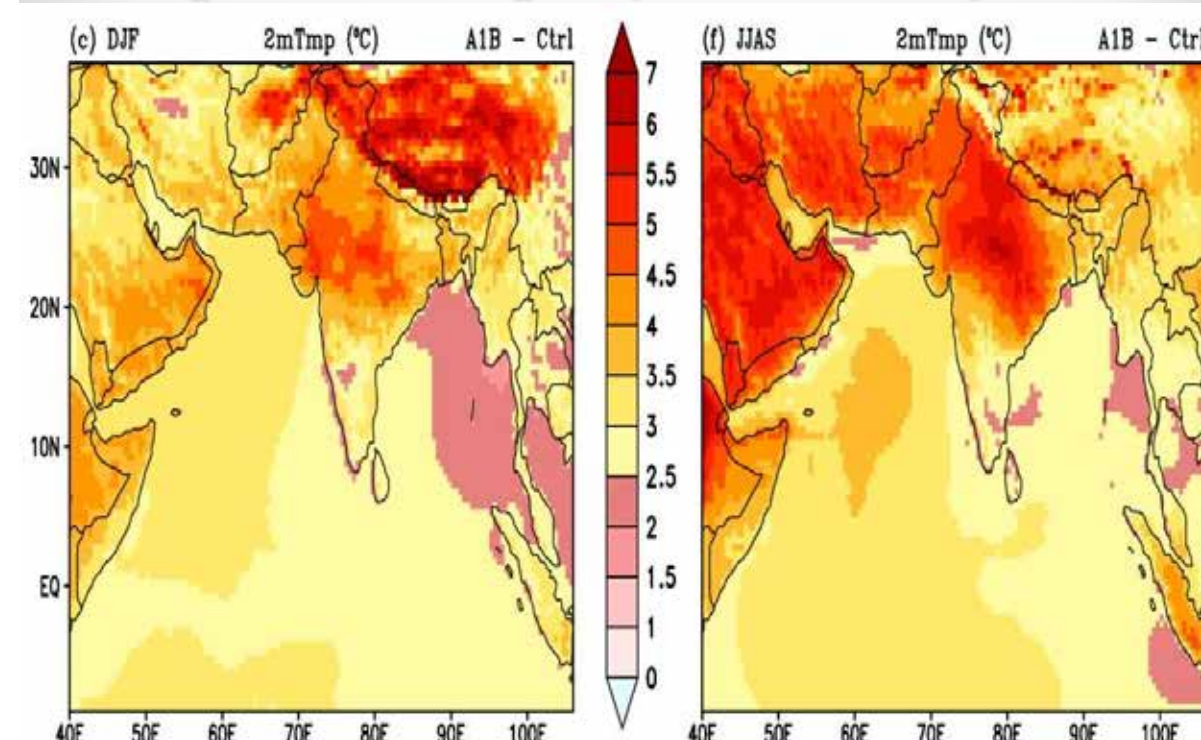
- Urbanisation is one of the most significant trends of 21<sup>st</sup> Century.
- India is the second largest urban system in the world with almost an 11% of the total global urban population living in Indian cities.
- Proportion of urban population increased from 10.8% to 31.2% in 2022 and is expected to increase to 50% in next few decades.
- Urban population grew from 91 million to 377 million between 2001 to 2011.
- Urban population growth is expected to contribute to about 73% of the total population increase by 2036 (MoHFW, 2019).
- By 2050, an additional 400 million people are expected to live in Indian urban settings i.e., doubling in four decades from 2014. (UN DESA, 2014).



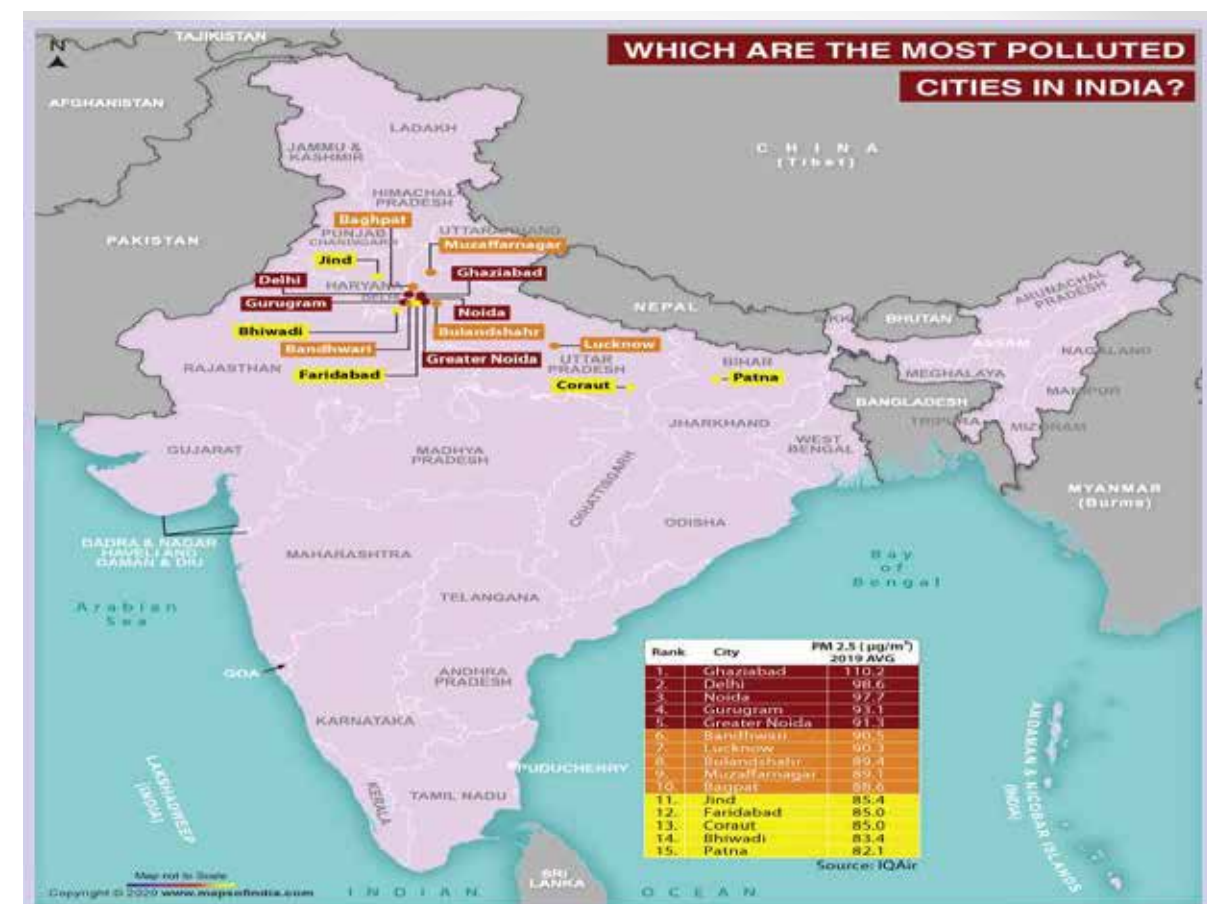
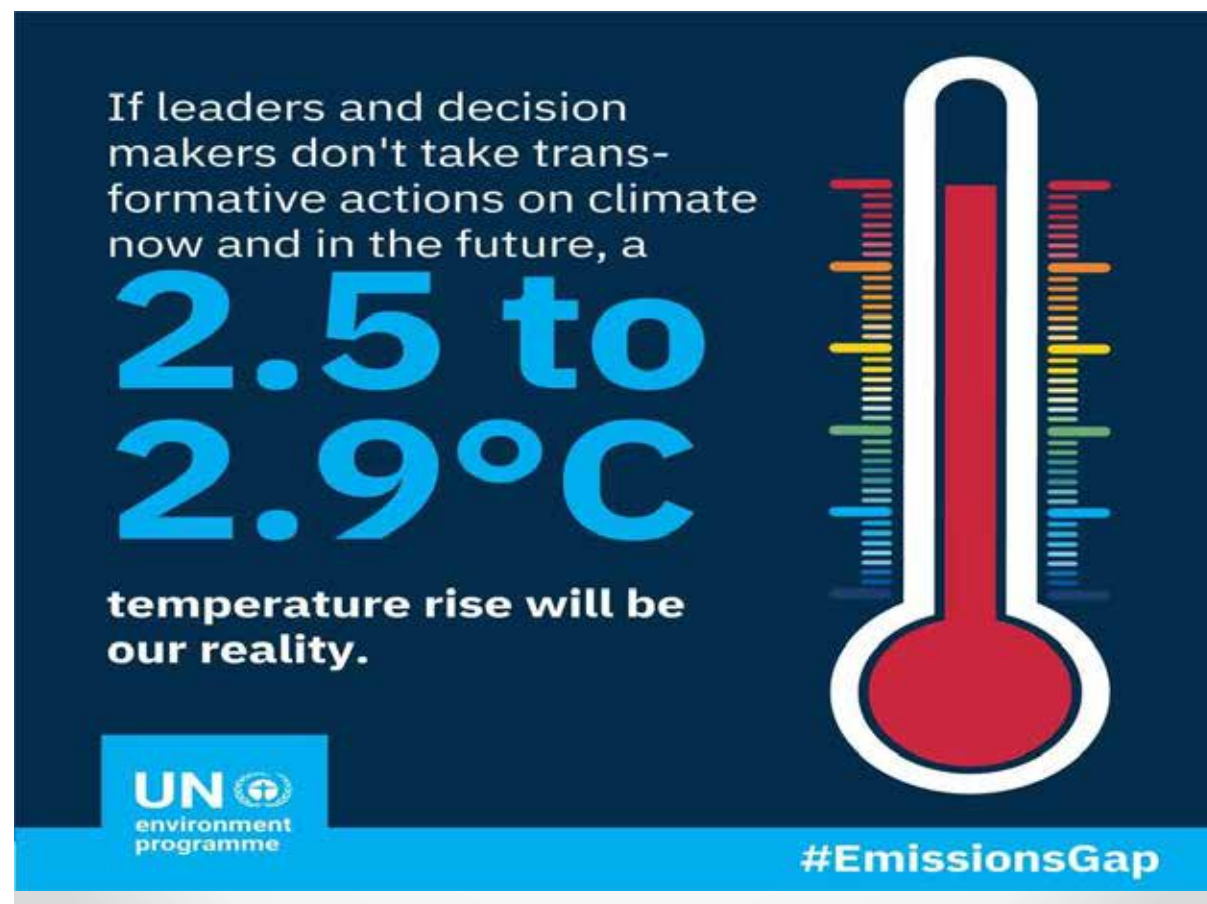
## Urban population growth trend

- All India population growing at 2 percent
- Urban Population: 2.75 percent
- Large Cities: 4 percent
- Slum population at 5 to 6 percent

## Temperature projections by 2030







## Extreme weather conditions for India ...



## What is the Impacts

- The speed and intensity of the change due to climate is very intensive
- The earth experienced an unprecedented warming in 2023 with 92% of the increase attributable to human activities.
- The unbearable heat, air pollution and cold wave, snowmelt and glacial lake outbursts
- Urban heat island (UHI) effect in cities is more due to higher population density, limited vegetation and green cover, and concentration of concrete structures.
- Massive flooding due to the heavy and intensive rain within a very short period and landslides
- Droughts becoming more intense and severe
- Increasing malnutrition and related health disorders such as child stunting
- Heat waves contribute to the rise in morbidity, mortality, and injuries in urban areas.
- Lack of sanitation and potable water increases contaminated water and food-borne diseases like cholera, typhoid, diarrhoea, hepatitis, and gastroenteritis in many slum areas.
- Warmer cities increase respiratory diseases due to pollution.
- Climate change increases in the burden of vector-borne diseases such as dengue, malaria and lymphatic filariasis.
- Water Crises in all major cities



- According to the [World Meteorological Organisation](#), sea level rise is a major threat for India's large coastal populations mainly living in Chennai and Kolkata.
- A 2019 study by the Tata Centre for Development at the University of Chicago warned that if India continues on a path of high emissions, by the year 2100, it could face as many as 1.54 million additional deaths per year due to heat-induced by climate change.
- A recent study estimated that the average of 1.19 tonnes per capita carbon emissions across metropolitan cities of India in compared to the national average is 0.93 tonnes per capita.
- It also manifests as extreme weather events, leading to the loss of lives, livelihoods, assets, and social well-being.
- Most of Indian cities now witness high air pollution and crossed severe categories and have a huge impact on the population's health, education and urban economy.

## Vulnerable Population

- Slum population
- Co-morbidity
- Women
- Elderly
- Children
- Homeless
- Rag-pickers
- Street children
- Rickshaw Pullers
- Construction and brick and lime Klin workers
- Sex workers
- Temporary Migrants

## Climate Policies and action

- India's per capita emissions are one third of global average
- It has contributed only 4 per cent (until 2019) to the cumulative global emissions.
- India secured 8th position in the Climate Change Performance Index 2023 in respect to GHG Emissions, Renewable Energy, Energy Use and Climate Policy
- Target to reduce the emissions intensity of India's GDP to 45 percent by 2030
- Achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030
- A net zero by 2070 target at COP26 in 2021
- The Government of India launched National Action Plan on Climate Change (NAPCC) on 30<sup>th</sup> June, 2008 outlining eight National Missions on climate change. These include:
  1. National Solar Mission
  2. National Mission for Enhanced Energy Efficiency
  3. National Mission on Sustainable Habitat
  4. National Water Mission
  5. National Mission for Sustaining the Himalayan Eco-system
  6. National Mission for a Green India
  7. National Mission for Sustainable Agriculture
  8. National Mission on Strategic Knowledge for Climate Change

India launched Mission on Lifestyle for the Environment (LiFE) in 2022

- Making local bodies environment-friendly
- saving water
- saving energy
- reducing waste and e-waste
- adopting healthy lifestyles
- adoption of natural farming
- promotion of millets
- Eco-clubs have been formed in schools and colleges to educate students and to spread awareness on environmental issues.
- Early warning system SMS and call service by govt of India

- The Ministry of Housing & Urban Affairs anchors the National Mission on Sustainable Habitat (NMSH) on Climate Change.
- NMSH 2.0 is in line with international climate change agenda, the Sustainable Development Goals and India's Nationally Determined Contributions.
- The objectives of the Mission are implemented through the Missions and schemes of the Ministry.
- The mitigation and adaptation strategies are identified across five identified themes, namely,
- (i) energy and green building, (ii) urban planning, green cover and biodiversity, (iii) mobility and air quality, (iv) water management, and (v) waste management.
- These are intended to address the overarching framework to facilitate adoption and implementation of the sector-wise climate action strategies.

### Climate Centre for Cities (C-Cube)

C-Cube was established in association with the MoHUA with a vision to build, 'Climate Actions in Cities' by including climate lenses in the development process with multi sectoral collaborations.

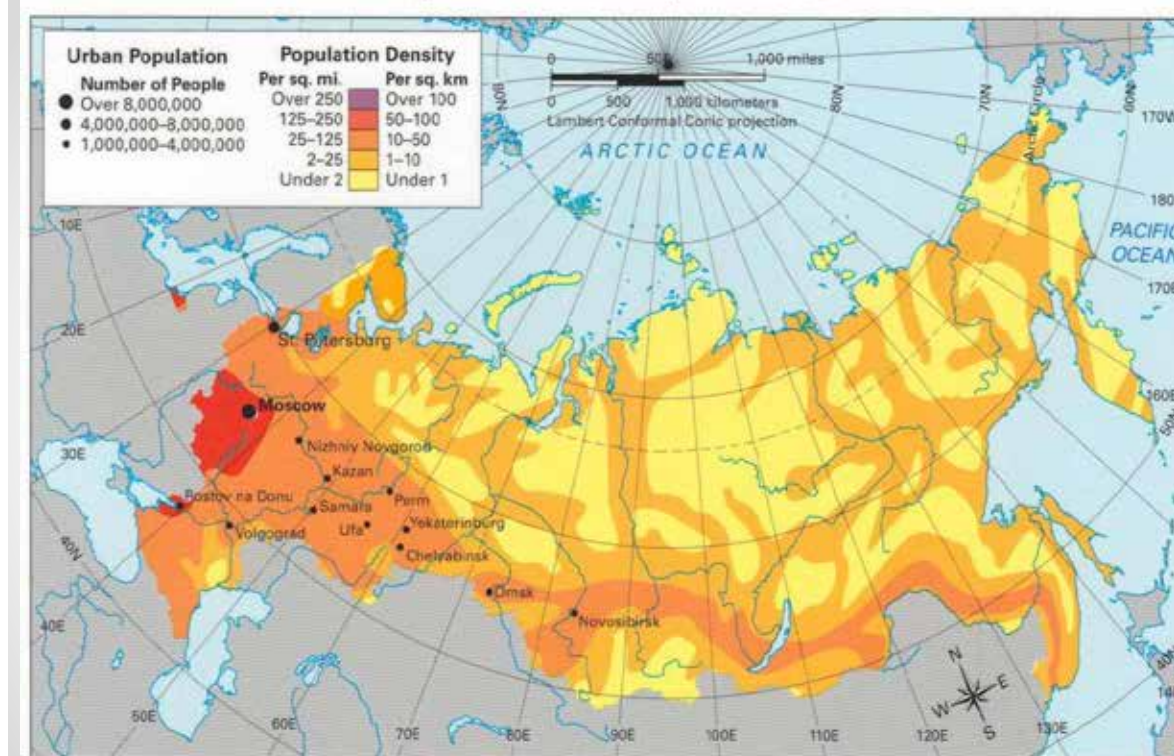
### Smart City: Climate Smart Cities Assessment Framework

This was launched for the 100 Smart cities to incentivize a holistic, climate-responsive development. The Framework includes various air and climate-relevant parameters that shall guide the cities and help them to assess their own preparedness to tackle the menace of climate change and degrading air quality.

### Climate Smart Cities Alliance

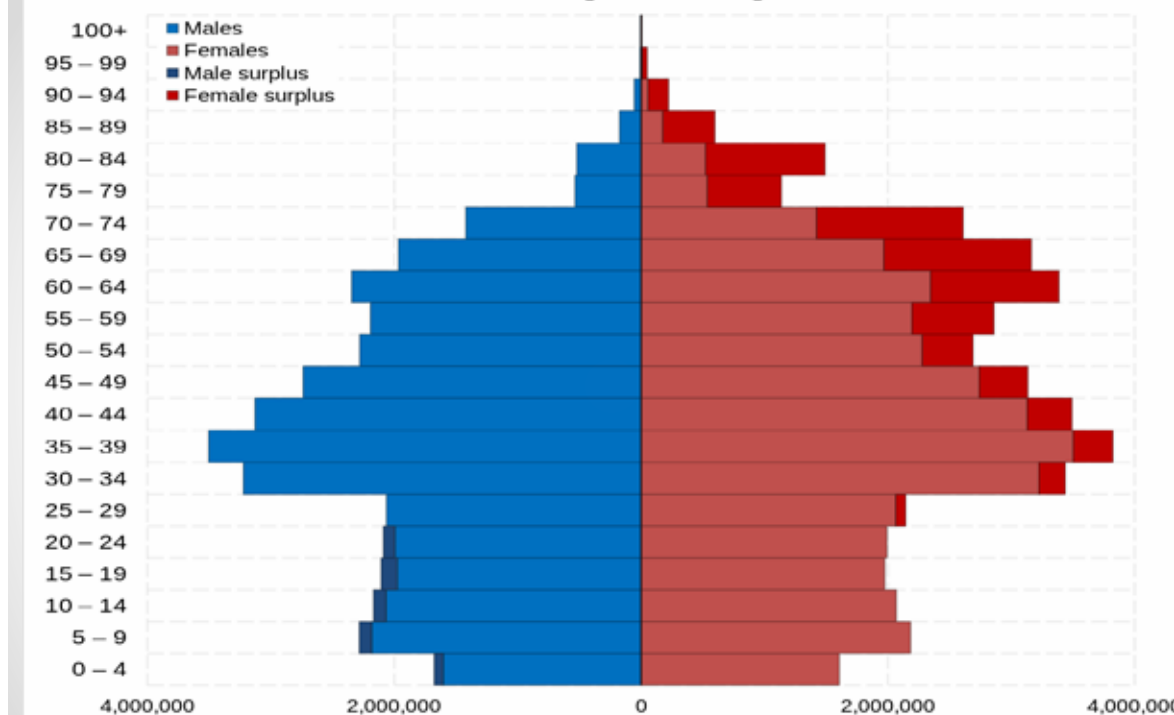
Ministry has envisaged a ClimateSmart Cities Alliance to mainstream climate actions in Urban India. These strategic partnerships will bring together the diverse skills, strengths and resources for implementing projects, sharing knowledge & good practices, and scaling up transformative action to address the increasing climate risks in Indian cities.

### Population Density of Russia



<https://russiamap360.com/russia-population-map>

### Russians (urban) – 2021



[https://commons.wikimedia.org/wiki/File:Russian\\_%28urban%29\\_ethnic\\_group\\_population\\_pyramid\\_2021.svg](https://commons.wikimedia.org/wiki/File:Russian_%28urban%29_ethnic_group_population_pyramid_2021.svg)

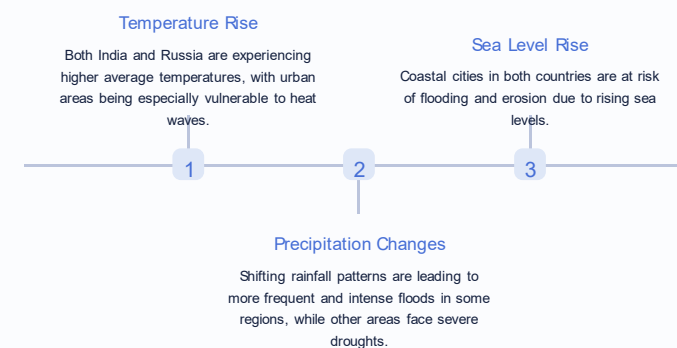


# Demography

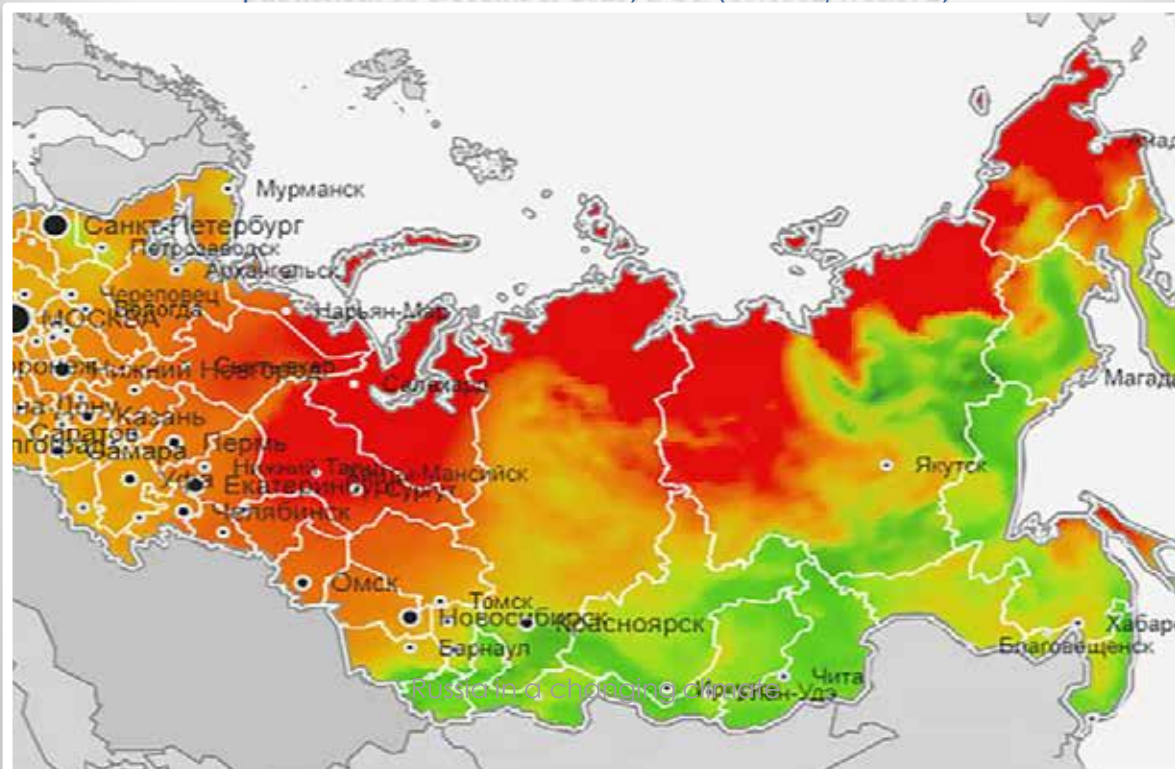
- Russia's 2023 population is estimated at 146.33 million people
- Russia's population equals 1.8% of the world population.
- Russia ranks number 9 in the list of [countries by population](#).
- The population density in Russia is 9 per Km<sup>2</sup> (23 people per mi<sup>2</sup>).
- 75.0 % of the population is urban area (2024)
- 83.1 % of the population will be in urban area by 2050
- The median age in Russia is 39.2 years.
- More than 70 cities exist in the Russian Federation



## Climate Change Trends and Projections for Urban Areas



WIREs Climate Change, Volume: 15, Issue: 2, First published: 18 December 2023, DOI: (10.1002/wcc.872)



## Vulnerabilities of Urban Populations to Extreme Climate Events

### Infrastructure Damage

Extreme weather can overwhelm and damage critical infrastructure like transportation, energy, and water systems, disrupting essential services.

### Impacts on Livelihoods

Low-income communities are disproportionately affected, facing job losses, food insecurity, and health risks.

### Displacement and Migration

Severe climate events can force people to flee their homes, leading to internal displacement and migration challenges.



## Current Policies and Programs in India and Russia

- 1 **India's National Action Plan on Climate Change**  
Comprehensive framework to address mitigation and adaptation strategies.
- 2 **Russia's Climate Doctrine and Adaptation Plan**  
Outlines priorities for reducing emissions and building resilience.
- 3 **Urban-Focused Initiatives**  
Both countries have launched programs to improve disaster preparedness and green infrastructure in cities.

## Collaboration and Knowledge Sharing between India and Russia



## Sustainable Solutions for Urban Resilience



### Green Infrastructure

Investing in nature-based solutions like urban forests, green roofs, and permeable surfaces.



### Early Warning Systems

Developing robust early warning and emergency response mechanisms.



### Community Engagement

Empowering local communities to participate in climate adaptation planning.



### Climate-Smart Infrastructure

Designing and retrofitting urban infrastructure to withstand extreme events.

## Area of Cooperation

- Innovations and management of green ecosystem
- Urban planning and management
- City plan for climate-related disaster management
- Role of AI and machine learning for Vulnerability assessment of the urban cities and climate action plan
- Climate-inclusive smart city to achieve the sustainable development agenda.
- Climate resilient health system
- Promotion of innovative technologies, finance instruments and private sector engagement
- Renewable and green Energy: Solar, Nuclear, hydro and wind
- Smart transport: E-vehicle and energy-efficiency transport system
- Smart City: Waste management and sustainable urbanization
- Green technology for industrialization
- RND for clean air
- The major objective is to save mankind, increase the happiness index, protect our cities, and achieve net zero emissions by 2050.



## Conclusion and Call to Action

- Addressing the climate crisis in India and Russia's cities requires a comprehensive, collaborative, and sustainable approach.
- By strengthening policies, mobilizing resources, and empowering communities, we can build urban resilience and safeguard the future of our cities.

*Thank You*



**SUSTAINABLE CITIES'  
HORIZONS.  
VEB.RF VISION**

Manuilov Nikita  
Andreevich

## Sustainable cities' horizons VEB.RF vision



VEB|RF

### CONTENTS

1. Cities in Russia and VEB.RF agenda
2. Russia's City Life Index
3. Russian cities' Sustainable Development Principles

VEB|RF

2

### CITIES IN RUSSIA

VEB|RF

1100+

cities

75%

population

69%

GDP

16

million-plus cities

25,6

thousand people – median cities population



3

### CITIES IN VEB.RF AGENDA

VEB|RF

~2 trln. ₹

the volume of urban projects with the participation of VEB.RF

>90 cities

covered by VEB.RF projects

ESG

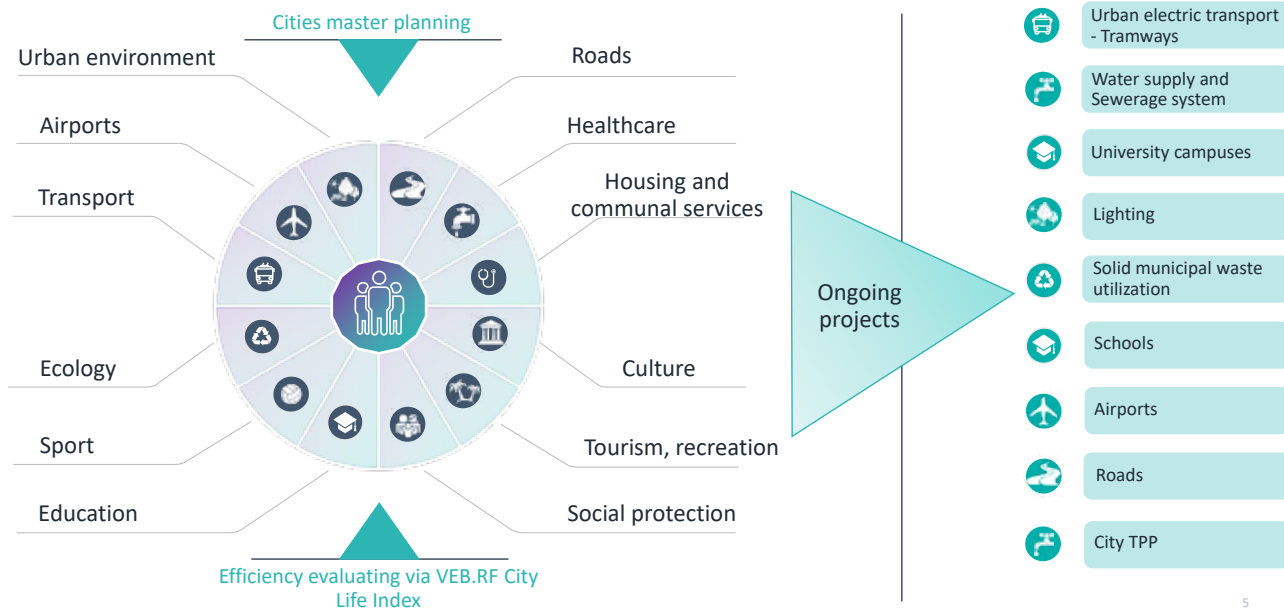
assessment has been introduced into the procedure for selecting investment projects of VEB.RF



4



## MENU OF URBAN ECONOMY PRODUCTS



5

## RUSSIA'S CITY LIFE INDEX



citylifeindex.ru



### What comes next:

200 cities more, agglomeration analysis, EAEU cities involvement, financial performance, partnering with Russian Public Opinion Research Centre, Agency for Strategic Initiatives, Ministry of Construction, Rosatom and Rusal

### We offer a methodology for business to assess:

- the impact of business operations on sustainable urban development
- the impact of initiated projects on quality of life in cities

### We invite to cooperation

major socially responsible companies, municipal and regional administrations, sectoral experts, scientists and community leaders

VEB.RF Russia's City Life Index

7

## Russia's City Life Index VEB.RF Index Summary



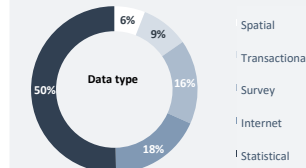
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## INDEX INDICATORS

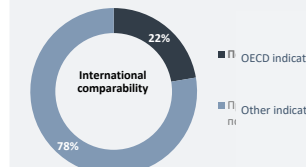
Index indicators to assess quality of life are grouped into 11 dimensions

- Housing
- Income and jobs
- Health
- Education
- Mobility
- Urban development and improvement
- Environment
- Safety
- Health
- Work-life balance
- Life satisfaction\*

The assessment is based on objective data from multiple sources



Almost 25% of indicators are comparable with OECD cities



2023 Index

**218** +103

Expanded geography

**300** +30

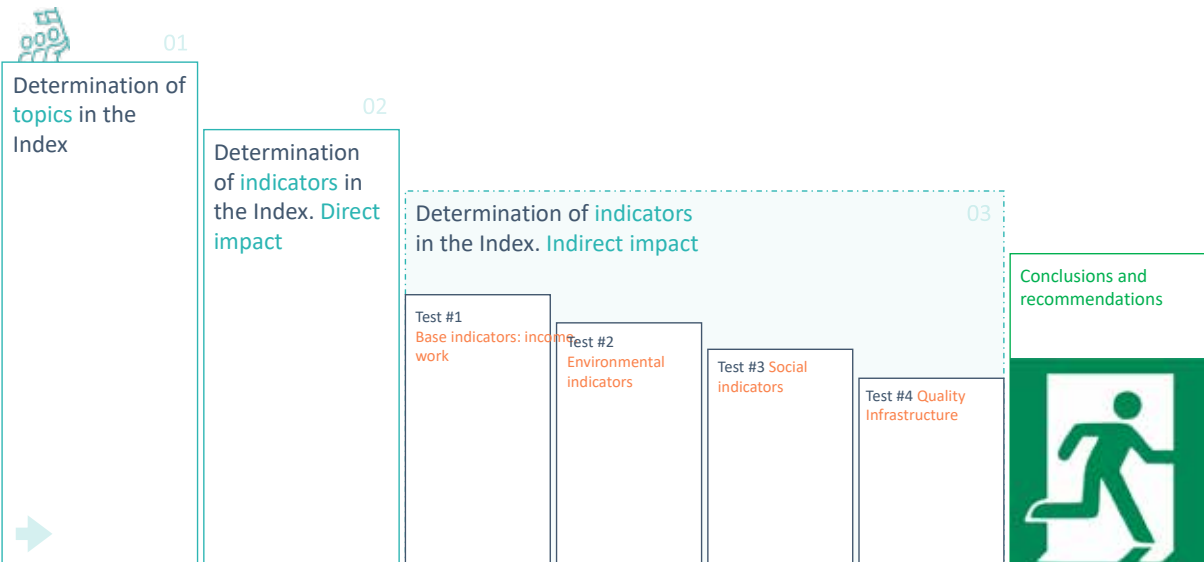
New indicators

The total score for each of the 11 dimensions is the average number of points for all indicators within the dimension

VEB.RF Russia's City Life Index

DEGREE OF IMPACT OF THE PROJECT

VEB.RF



VEB.RF Russia's City Life Index

9

CREATION OF NEW SOCIAL SERVICES FOR CITIZENS USING SOCIAL IMPACT PROJECTS (RUSSIAN SIB ANALOGUE)

VEB.RF



Improving the educational results of schoolchildren in the Republic of Sakha (Yakutia) 2019-2023

The winning project in the category "Corporate Social Responsibility" 2020

Creating conditions for low-income families with children to overcome a difficult life situation 2021-2022

Merit award in the category "Financial Inclusion" 2022



Accompanied residence for people with mental disorders in Chelyabinsk region 2021-2023

The winning project in the category "Human Capital Development" 2024

- Direct impact**
- Integral indicator of education quality
- Indirect impact**
- The degree of popularity of creative topics in search engines, Wordstat Yandex, score

- Direct impact**
- The proportion of the population with monetary incomes below the subsistence level established in the subject, %
  - unemployment rate, %
- Indirect impact**
- The share of established firms, %

- Direct impact**
- The average self-assessment of the population's satisfaction with their lives, score
- Indirect impact**
- The share of employed persons with disabilities from the total number of people with disabilities of working age, %

VEB.RF Russia's City Life Index

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RENOVATION AND EXPANSION OF THE STREETCAR NETWORK AS PART OF THE TAGANROG TRAM PROJECT

VEB.RF



Start of the project — September 2021  
Lifetime of operation — 30 years

The project has an impact on the Mobility topic

Indicator	Impact	
"Number of motor road vehicles per 100 people"	The project will expand the coverage of the streetcar network, increase the number of streetcars on the routes, reduce traffic intervals from 5-30 minutes to 2-15 minutes, and increase the average speed of streetcars from 10 to 18 km/h.	Direct impact
"Share of transportation by urban electric transport"	Due to the aforementioned advantages, citizens will be more inclined to choose the streetcar as a means of moving around the city.	
"Personal Earnings"	The expected average salary at the project will be about \$9,921 per year, with the indicator value of \$6,560.14 per year as of 2019 in Taganrog.	Indirect impact
"Long-term unemployment rate" "Employment rate"	The project will not have a significant impact on the change in horizontal indicators at the city level in the area of employment, since the creation of 465 jobs as a result of this project is not significant on a citywide scale.	
"Satisfaction with life as a whole"	The project will have a significant impact on the change in values of the indicator "Satisfaction with life as a whole", since the planned passenger flow (about 95,000 people per day) is about 38.2% of Taganrog's population. The impact of the project on the indicator can be measured through sociological surveys after the project is implemented.	
"Mortality rate due to diseases of the circulatory or respiratory systems, for the under 65-year-old population"	The development of energy-efficient public transport reduces the levels of emissions and fine particulate matter (PM2.5) in the atmosphere in the city, which results in improvement of the indicator. As part of the implementation of the Taganrog Tram Project, it is planned to reduce CO2 emissions from transport in the city by 30% by 2035.	
"Transport-related mortality rates"	Increased availability of public transport will reduce the load on road networks and, consequently, the number of accidents in the city. As part of the project implementation, it is planned to reduce the traffic of private cars by 14% by 2035 and to reduce mortality due to traffic accidents by 42%.	

VEB.RF Russia's City Life Index

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Russian Cities' Sustainable Development Principles

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## IDEA OF THE PRINCIPLES

VEB.RF

A <b>new vision</b> of the strategic objectives of the city's development - through the prism of environmental, social and managerial responsibility	<b>System implementation</b> of ESG principles both in current processes and when launching new projects aimed at transforming the urban environment towards sustainable development and improving the comfort of life for citizens	Facilitating the creation of conditions for the <b>interaction</b> of municipal authorities, the financial and non-financial sector to launch of ESG projects
Contribute to the creation of <b>standards</b> aimed at reducing the negative impact on the environment and social wellness and achieving sustainable development goals	<b>Success stories.</b> Building of a common library of solutions for the exchange of experience in the implementation of urban projects	Promoting development of <b>potential</b> in science, technology and innovation for sustainable urban development
The Principles will promote the launch of projects aimed at achieving sustainable development goals and consistent with ESG principles, which will improve the quality of life in cities		

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## RUSSIAN CITIES' SUSTAINABLE DEVELOPMENT PRINCIPLES

VEB.RF

**Russian Cities' Sustainable Development Principles** – is a document containing the basis of sustainable city development as an element of a comprehensive ESG transformation in the Russian Federation

- |   |   |
|---|---|
| <p><b>01</b> Implementation and promotion of the sustainable development agenda in Russian cities</p> <p><b>02</b> Application of specific support measures to improve the quality of life of citizens</p> <p><b>03</b> Improvement of the quality of life in the city outlined taking into account the principles of sustainable development in all areas of the urban economy</p> | <p><b>04</b> Individual way in the implementation of the sustainable development agenda</p> <p><b>05</b> Interaction between city administrations, development institutions and business in the field of sustainable development</p> <p><b>06</b> Exchange of best practices of sustainable development</p> |
|---|---|

<https://a36.pф/ustojchivoe-razvitie/khartiya-ustoi-chivkykh-gorodov-rossii/> (available in Russian)

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## THE DRAFT PRINCIPLES WERE PRESENTED AND SUPPORTED BY THE EXPERTS

VEB.RF



In August 2022, it was first presented to 118 cities and experts on the VEB.RF platform as part of a meeting of the Expert Council on Sustainable Development



The project was presented in March 2023. in Moscow at the VII annual conference "Sustainable development of cities and regions: challenges of long-term planning"



The project was presented at the environmental forum in Vologda in April 2023.



The project was presented during the round table "Economy, ecology, people: the basis of urban development" as part of the exhibition "Russian Coal and Mining" in Novokuznetsk in June 2023.



The project was presented in June 2023 in Moscow within the framework of the SCO Interbank Association (exchange of best practices)



The project was presented in November 2023 in St. Petersburg as part of V BRICS+ International Municipal Forum



The winning project in the category "Economic Development of Territories" 2023.

20+

Russian cities supported their willingness to join the Principles of Sustainable Cities

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## ESG SCHOOL

VEB.RF

- Educational ESG knowledge platform for:
  - city managers and city teams
  - citizens
  - business
- Education of citizens on sustainable development of the urban economy (videos, seminars, etc.)
- Methodological support of city teams responsible for the development of infrastructure and other areas of the city economy, attracting investments
- Gamification of the process of finding solutions for integrated urban ESG development

### What has already been implemented by VEB.RF :



Information and analytical **digital platform for urban development**, on which the City Life Index is based. The goal of the project is to assess the quality of life in Russian cities and to develop and improve the quality of life of Russian citizens.

<https://города.рф/>

### City management teams' education:

2020-2021 – MPA for management teams of the 100 largest cities in Russia

2023-2024 – hospitality industry education program for management teams from 200 cities



### Methodological support:

Study guide with detailed business cases for cities, developed by VEB.RF together with experts

Methodology document "National standard of city master planning"

<https://a36.pф/natsionalnyy-standart-master-planov/>

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## BEST URBAN CASE SOLUTION LIBRARY

- Cities' success stories added by cities, national development institutions and large companies
- Detailed information about ESG projects implemented in cities for various sectors of the city's economy, including description of the support measures applied.
- Use of successful experience and replication of the best practice in the implementation of ESG projects with an assessment of their impact on the quality of life.



International experience will significantly expand the competencies of city managers



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## HOW IT WORKS

1. Determine **topics** in the Index - City's areas for development

2. **Search** for urban solutions directly or indirectly aimed at improving the determined topic in the Index



Projects involving regional and federal funding

Projects with the participation of development institutions

Projects with private financing, incl. charitable

Projects requiring organizational support by city administration

3. Development of a comprehensive development project

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## EXAMPLE: EDUCATION

### Areas for development

- Integral indicator of education quality
- The share of students in state and municipal educational institutions studying in the first shift
- The share of school educational organizations whose buildings are in disrepair or require major repairs

### Creation of schools using the PPP model



**Territory:** Ulan-Ude, Republic of Buryatia  
**Budget:** 760,6 million ₽ (55,7% - private financing)  
**Instrument:** concession agreement  
<https://dpo.rosinfra.ru/projects-office/8657/form/questionnaire>

### Project "Sainuu" - murals decorated new schools



**Territory:** Ulan-Ude, Republic of Buryatia  
**Budget:** n/a (private financing)  
**Instrument:** sociocultural project  
<https://veb.ru/press-tsentr/56642/>

### Improving the educational results of schoolchildren



**Territory:** Pokrovsk, Republic of Sakha (Yakutia)  
**Budget:** 60 million ₽ (100% - private financing)  
**Instrument:** Social Impact Bond  
<https://es6.pfb/agent-pravitelstva/psv/socialnye-proekty/project-01/>

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## EXAMPLE: URBAN DEVELOPMENT AND IMPROVEMENT

### Areas for development

- satisfaction with the availability and equipment of park areas
- share of green public areas in the total area of green spaces
- share of residents who consider their city beautiful, out of the total number of respondents

### Creation of "Central Park of Culture and Recreation"



**Territory:** Volgograd  
**Budget:** 330 million ₽ (100% - private financing)  
**Instrument:** concession agreement  
<https://dpo.rosinfra.ru/projects-office/265/form/questionnaire>

### Apple orchard as part of a residential complex project



**Territory:** Moscow  
**Budget:** 29 million ₽ (100% - private financing)  
**Instrument:** private financing  
<https://www.mos.ru/news/item/124039073/>

### Creation of «Nagorny park»



**Territory:** Vladivostok  
**Budget:** 250 million ₽ (100% - private financing)  
**Instrument:** charity project  
<https://daily.alisha.ru/cities/21093-kak-glava-dns-za-svoi-250-mln-rublei-postroit-luchshiy-park-vo-vladivostoke-nagorny/>

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## CONCLUSIONS

VEB.RF

Sustainable development and improving the quality of life in cities is facilitated by:

- 1** A comprehensive assessment and monitoring system based, among other things, on the opinions of citizens.  
Example: VEB.RF City Life Index
- 2** Methodological support and educational programs for city management teams, businesses and citizens, in the basics of sustainable development (“ESG school”).  
Example: unified digital platform for urban development (<https://города.рф/>), education programs for city management teams, Russian Cities' Sustainable Development Principles
- 3** Exchange of experience in implementing projects for city development.  
Example: VEB.RF Best Urban Case Solution Library, Study guide with detailed business cases for cities

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# SUSTAINABLE CITIES’ HORIZONS. VEB.RF EXPERIENCE

Valerya Igorevna  
Rozhok

VEB|RF

## Sustainable cities' horizons. VEB.RF experience



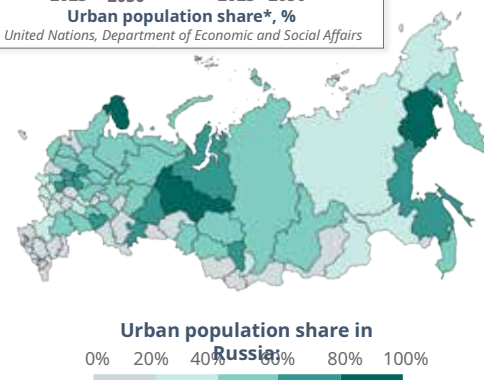
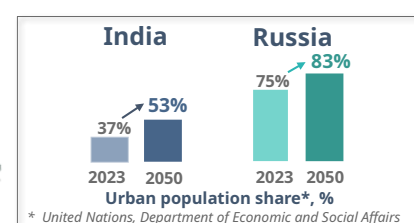
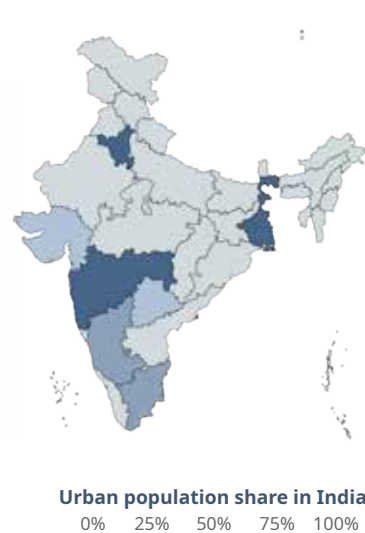
«We realize that a *happy city, green city and city that will save a person are the same place, and we have all to build it*»

Charles Montgomery  
«Happy City: Transforming Our Lives Through Urban Design»



## Urbanization growth in the World, Russia and India

«By changing cities, we affect both GDP and the quality of life of Russians»  
N. Tsekhomsky, First Deputy Chairman of VEB.RF



## VEB.RF is a partner of the State and private business

### BASIC BUSINESS PRINCIPLES

- No competition with commercial banks
- Breakeven result
- Environmental and social responsibility

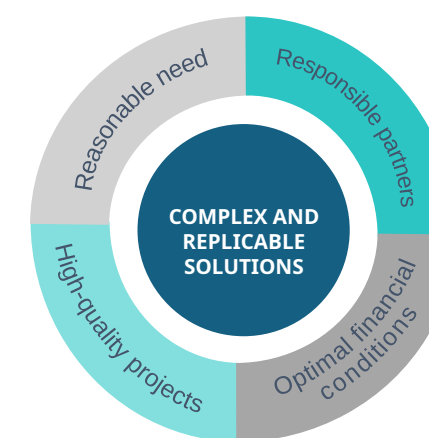
> 120 investment projects  
4 RUB trillion investment

### WE USE complex approach

We determine demand and evaluate effectiveness via the VEB.RF City Life Index, cities master planning and goals of state programs

### WE ASSIST manage projects

We accompany projects at all stages of development, striving to ensure a balance of interests of the parties, independent expertise and additional control



### WE BUILD UP efficient partnership

We involve trusted partners in projects. For 1P of VEB.RF funds there are more than 3P of private funds

### WE OFFER effective solutions

We combine various sources of financing, incl. using government support measures to minimize the participants' cost loading



## VEB.RF key business results in urban development

### What we do?

we are creating a new quality of life in Russian cities through the development of socially significant infrastructure

### How we operate?

we organize financing and assist in the implementation of projects in partnership with the government and business

**92** cities

developing infrastructure together with VEB.RF



**61 545** study places in **69 schools** will be created by 2025



**5 million people** are involved in the implementation of sociocultural projects

**190** projects

implemented in cities with the participation of VEB.RF



**97,5 million people** took advantage of new airports in 2023



**12 master plans and 7 tourist plans** are designed for developing of 12 agglomerations and 29 regions

**2** trillion ₺

attracted by VEB.RF in projects together with partners



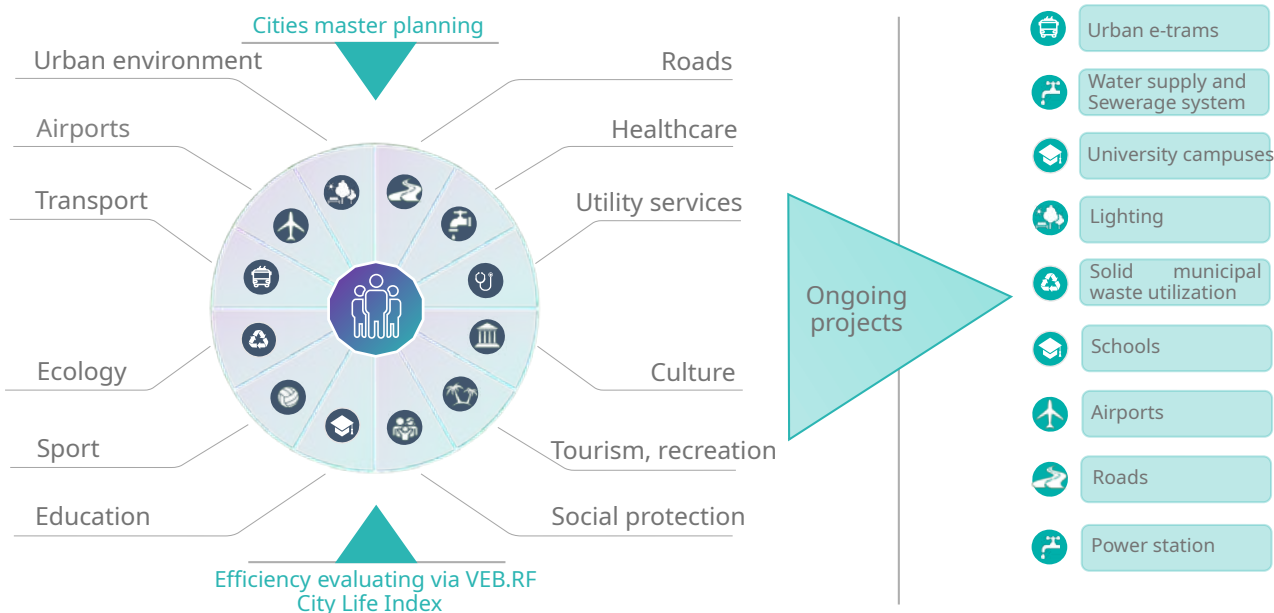
**14,9 million people** will have access to public services



**8,8 million people** will have access to public electric transport

### In certain industries and areas

## «Urban economy». Menu of products



## City Life Index, Library of Best Case Solutions are the tools for complex urban development

### Index purpose

To maximize the impact of investment on the people's quality of life

### Index task

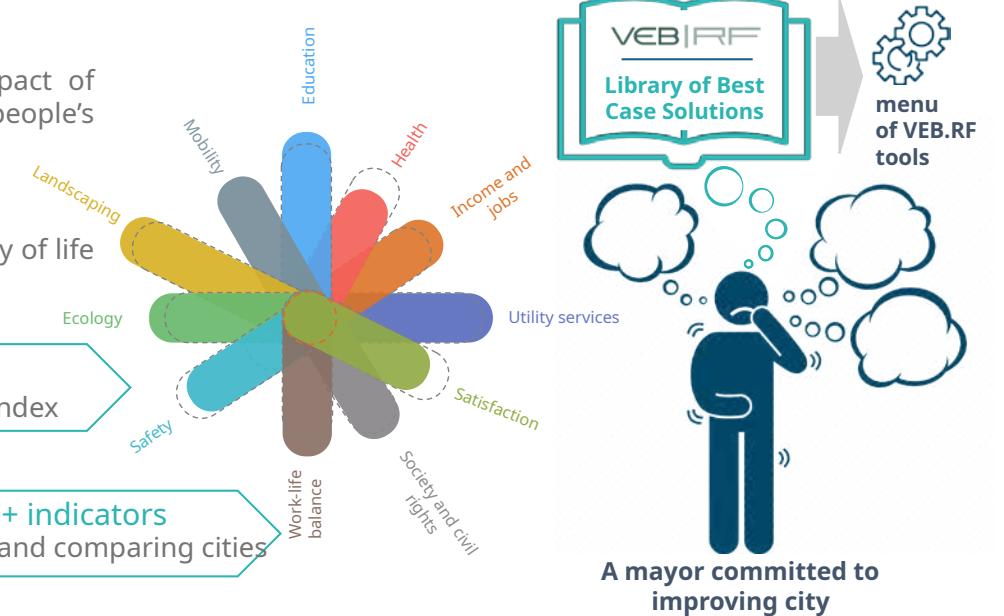
To enhance the quality of life of Russians

**218 Russian cities**

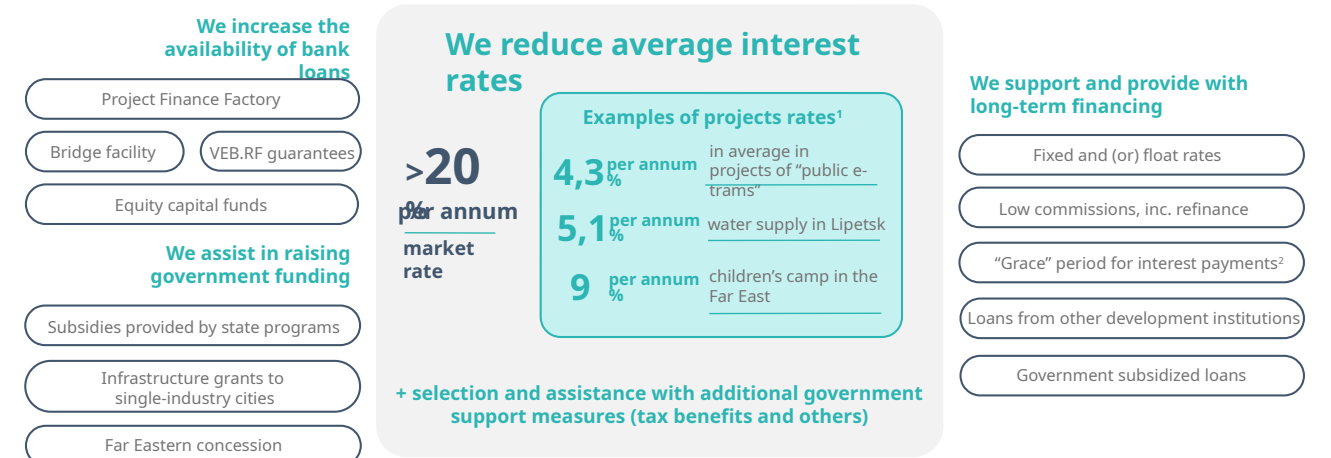
are included in the Index

**11 directions, 300+ indicators**

used for analyzing and comparing cities



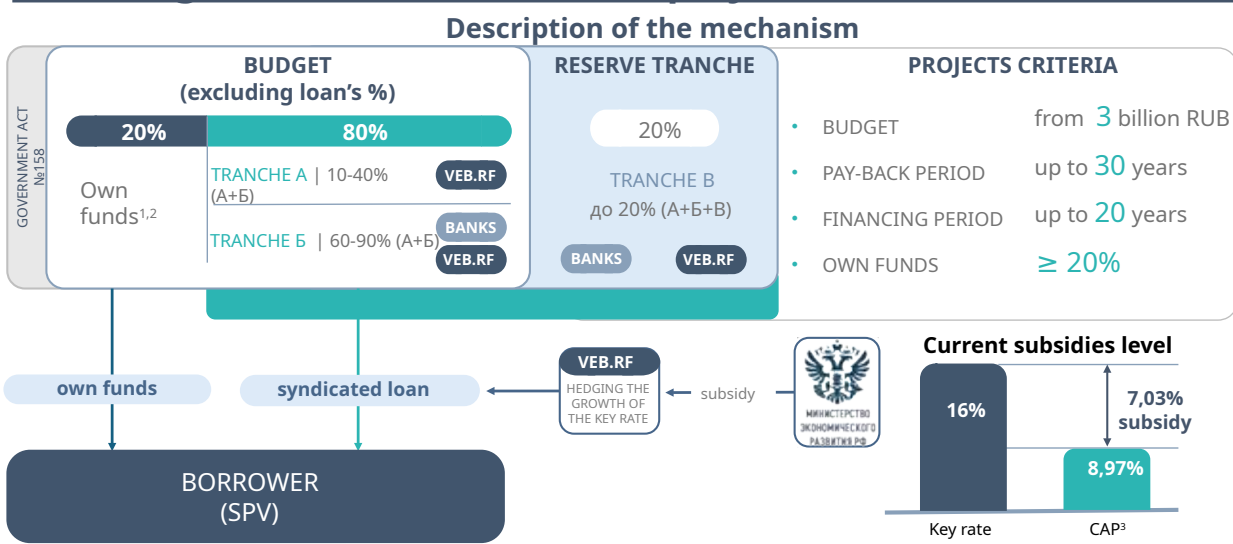
## VEB.RF uses ALL instruments to reduce the government and investors burden



<sup>1</sup> – average-weighted rate

<sup>2</sup> – bank's loan for interest payment during construction period

## PROJECT FINANCE FACTORY is a mechanism for syndication financing substantial investment projects with commercial banks



<sup>1</sup> Sources: 1) equity funds (up to 50% of own funds and up to 10% of the budget); 2) investors funds (up to 10%)  
<sup>2</sup> The share of own funds can be reduced to 15% if: 1) project has been approved until 2024; 2) VEB's participation is 25% of the budget and less; 3) Tranche A is 10% of the budget and less  
<sup>3</sup> For projects approved in the 2<sup>nd</sup> quarter of 2024

## A taxonomy of green and adaptation projects. ESG questionnaire

Green projects taxonomy		Taxonomy of adaptation projects		Projects effects	
Contains projects recognized as green in leading national and international green practice	Contains projects with significant positive effects, but not recognized as explicitly green in global practice	T test	Technology based on cathode material	Yes	
		Q test	Meets with 8 criteria	Yes	
		Green/adaptation/social project (in accordance with the Russian taxonomy)		No	
		Social effects		Yes	
		<ul style="list-style-type: none"> <li>Number of jobs created at the operational stage of the project – 1100</li> <li>Share of jobs for local citizens in the total number of jobs – 57%</li> </ul>			
<b>Features of the project implementation</b>					
Specific features of the project				Yes	
Categories of negative impact on environment Criteria: The use of industrial waters in the technological process				III	
<b>Additional information about the project</b>					
Participant of the ESG declaration				Yes <sup>2</sup>	
In-depth ESG risk assessment of the project (inc. the principles of Standards of Responsible Making Business)				No	

**Environmental effects<sup>1</sup>**

- Annual savings:
  - fuel 290,000 m3/year of natural gas by designing buildings with a high degree of energy efficiency
  - 34,800 GWh/year of electricity and heat through the use of highly efficient equipment
  - 2,200 m3/year through the use of water circulation systems in the equipment
  - Annual renewable energy production 4000 MWh/year
- Annual waste disposal volume 1500 tons/year
- Pollutants are not discharged

1. Compared to the base scenario  
2. Participant of the UN Global Compact

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## Development of digital Russian services and solutions

**GOVERNMENT ACT OF THE RUSSIAN FEDERATION №1598 OT 05.12.2019**

**Financing projects for the implementation and design of Russian digital solutions from 1 billion rubles and up to 10 billion rubles:**

- IT buyers financing
- IT developers financing

**RATE**

- 1% - 5% - for IT buyers
- 1% - 3% - for IT developers

**PROJECT IMPLEMENTATION PERIOD**  
until 31.12.2024

**EXAMPLES OF PROJECTS**

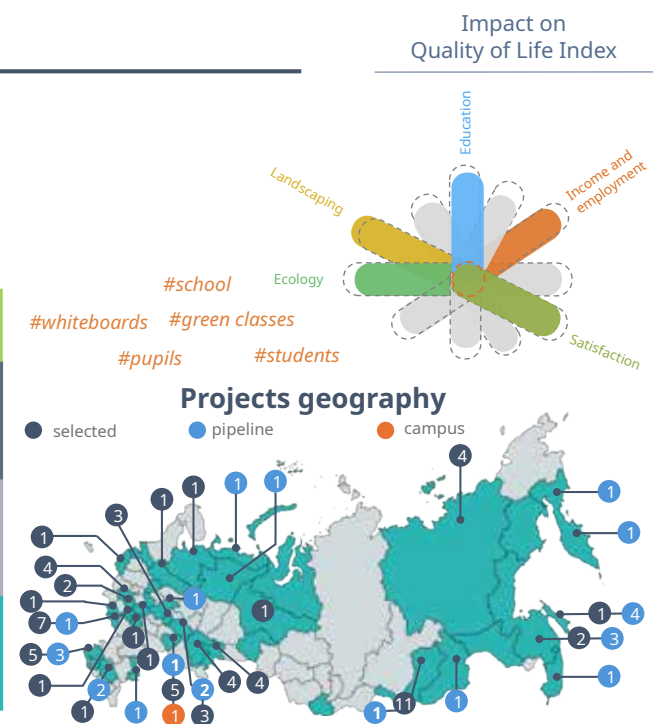
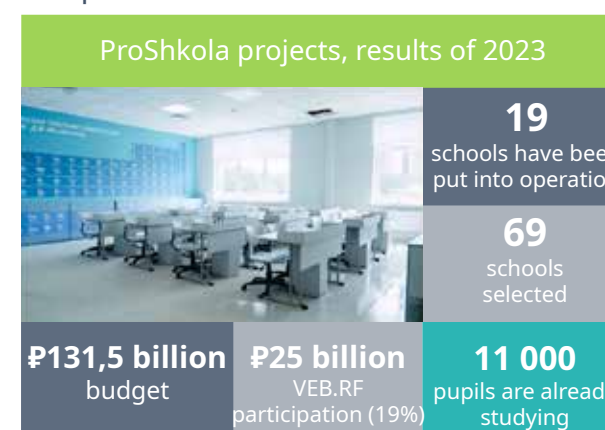
- Cybersecurity**
  - Response and prevention of attacks
  - Secure remote access
- Digital power station**
  - Optimization and efficiency improvement of technological maintenance
- Digital railway station**
  - Unified information platform for monitoring the railway infrastructure in real time

**RESULTS**

- 55** IT developers are supported, inc. 2 Scientific Research Institute и 2 universities
- 22** Software: prematurely designed and entered in the registered as Russian software

## Building schools

«ProShkola» (VEB.RF group) is the largest concessionaire in education PPP industry. ProShkola attracts private and government funds for schools and campuses construction.





## «By building schools, we create the future»

Y. Korsun, deputy chairman of VEB.RF

### Key principles for equipping schools and campuses

All our facilities are equipped on a turnkey basis and comply with the next principles



Own boiler station



3D-printers



Science class



Chemistry class

#### 1 Transparency

- ✓ glass partitions
- ✓ "second" light
- ✓ "zenith" lights (windows are in the ceiling)

#### 2 Mobility

#### 3 Accessibility for the disabled

#### 5 Energy efficiency

- ✓ own boiler station
- ✓ sophisticated ventilation systems that allow save up to 55-60% of heat
- ✓ solar collectors for hot water heating

#### 6 Processability

- ✓ cutting edge tools:
  - digital interactive whiteboards
  - VR classrooms
  - laser machines
  - 3D-printers

#### 4 Safety

- ✓ surveillance cameras
- ✓ modern access control system

#### 7 Environmental friendliness

- ✓ green classes
- ✓ eco-friendly finishing materials
- ✓ winter garden

## Public electric transport development

### Program purpose

To improve safety and transport mobility of the citizens

#### Program concept

- ✓ 10 cities with 8.8 million people
- ✓ Modernization/construction of 620 km tram tracks
- ✓ Purchase of 647 low-floor trams
- ✓ Construction of 11 depots and 96 substations

#### Financing sources

- ✓ Capital grant
- ✓ VEB.RF and National Welfare Fund
- ✓ Funds of investors

>₽250 Bn  
Budget

₽ >93 Bn  
share of VEB.RF  
(>37,2%)

PPP  
mechanism

20-25 years  
concession  
period

#### Effects program

- ✓ Increasing mobility by 20%;
- ✓ Minimization of travel time by 15-20%;
- ✓ Reduction of traffic accidents by 15%;
- ✓ Improving passenger safety;
- ✓ Reduction of GHG emissions;
- ✓ Decreasing of the road traffic;
- ✓ Improving of citizens satisfaction, including mobility impaired people, with the quality of services;
- ✓ Work creation



## Airport development

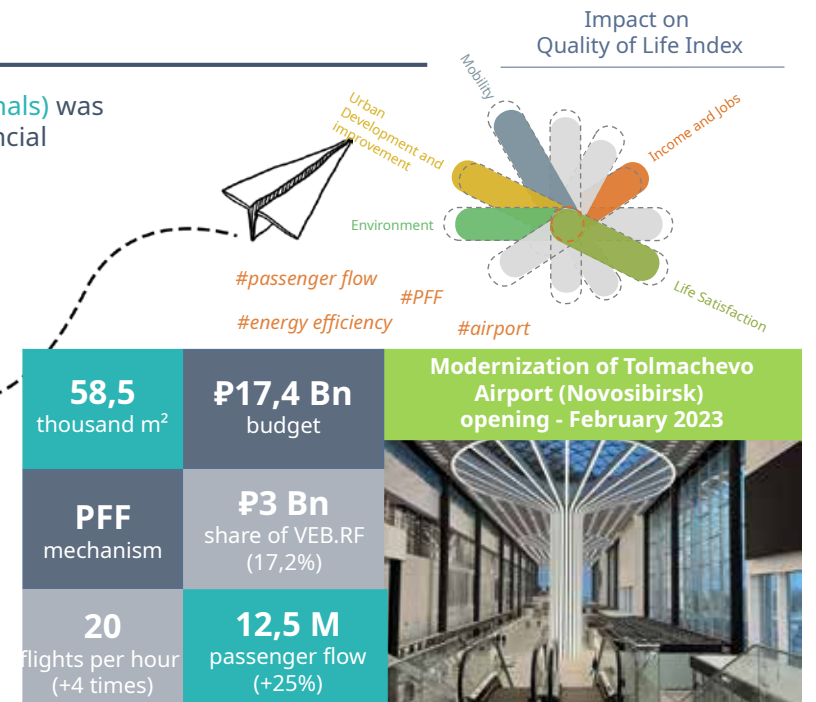
- ✓ Every fifth airport in Russia (10 terminals) was built or modernized with VEB.RF financial support

- ✓ Airports financed by VEB.RF cover 40% of total regional passenger flow

- ✓ Pipeline: +8 regional projects, including 5 in the Far East and the Arctic zone

### Features of Tolmachevo terminal

- ✓ Energy efficient buildings;
- ✓ Efficient luggage handling system



## Modernization of the wastewater disposal and water supply system

VEB|RF (25%)



РОСВОДОКАНАЛ (75%)

Joint venture to modernize utility infrastructure in Russian regions

- ✓ Projects in 8 cities totalling 375.6 bn rubles are in progress
- ✓ Share of VEB.RF – 32,9 bn rubles (8,8%)

Modernization of water supply and wastewater disposal networks in Lipetsk

### Project effects

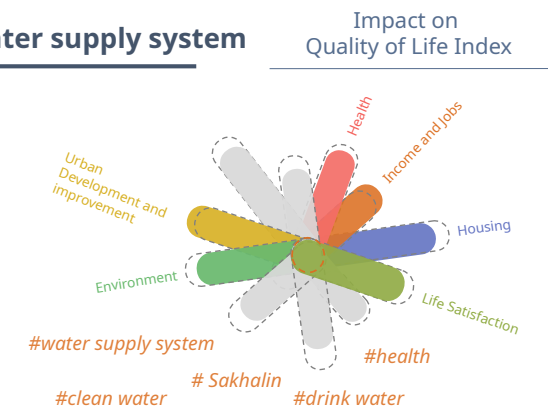
	Target indicator
Water losses on networks	22% (-29%)
Share of drinking water that doesn't meet the requirements	0,58% (-56%)
Share of wastewater that doesn't meet the requirements	37% (-40%)
Number of accidents on networks	6,40 (-30%)
	units/km/yea

### Project purposes

- Addressing accumulated depreciation
- Modernization of sewage treatment facilities
- Development of water supply and wastewater disposal systems in terms of maintaining the city's urban planning potential

### Project concept

- ✓ Budget – ₽10,4 bn;
- ✓ Share of VEB.RF – ₽1,0 bn (13,0%); DOM.RF – ₽5,1 bn (66,2%); FRT – ₽1,6 bn (20,8%);
- ✓ Implementing tool – PPP;
- ✓ Funding period – 2022-2036;
- ✓ Concession maturity – 2021-2071



## Sociocultural project «The Way of Water»

Year of launch - 2022

The way of water

Lipetsk Baikal'sk

Yuzhno-Sakhalinsk

VEB|RF РОСВОДОКАНАЛ ИМПРЕСАРИО

### Project concept

An audio performance created in collaboration with the citizens, telling the story of the city through the prism of water way

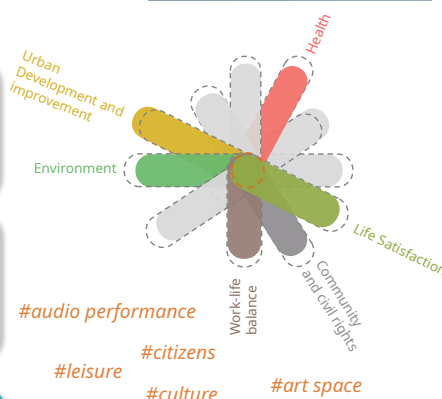
### Project purposes

- Rethinking the water consumption process;
- Improving the environmental education of citizens

Numerous brightly colored art installations with QR codes

A walking route with an audio guide including more than 20 stories of residents about water locations

Impact on Quality of Life Index



recognized as the best in the nomination «Communications in the field of sustainable development: environmental projects», 2022  
 >12 000 citizens took part in the project

## The trend is to invest in «environmental» companies in the World and in Russia. Russian and global stock exchange indices in 2015-2024

World



Since 2020, foreign investors focused on companies that meet the principles of sustainability, which is reflected in higher growth rates of companies: «environmental» companies have grown faster by 0,14 p.p. on average over the past 9 years



Source: S&P Global

Russia



For 9 years, shares of Russian «environmental» companies have demonstrated outrunning growth compared to the general market: their annual growth exceeded market growth by 1,17 p.p.



Source: MOEX

## Socio-cultural program «Five Steps for Cities»

Year of launch - 2022

VEB|RF STRELKA KB

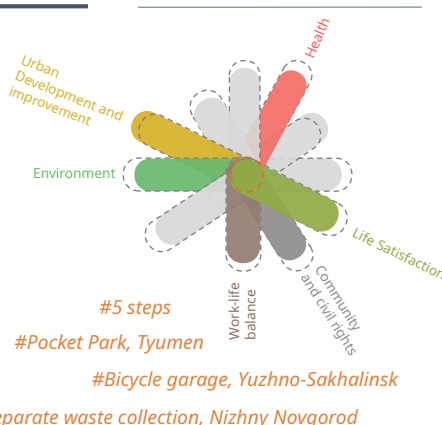
### Program purpose

To initiate the engagement of citizens in enhancing the quality of life

Step 1. «City Nearby»	Clean up what you have near the house
Step 2. «Preserve the Planet»	Make the city more green
Step 3. «Breathe Life»	Add color and variety to the city
Step 4. «Add energy»	Create healthy habits
Шаг 5. «Собери своих»	Fill the city with events



Impact on Quality of Life Index



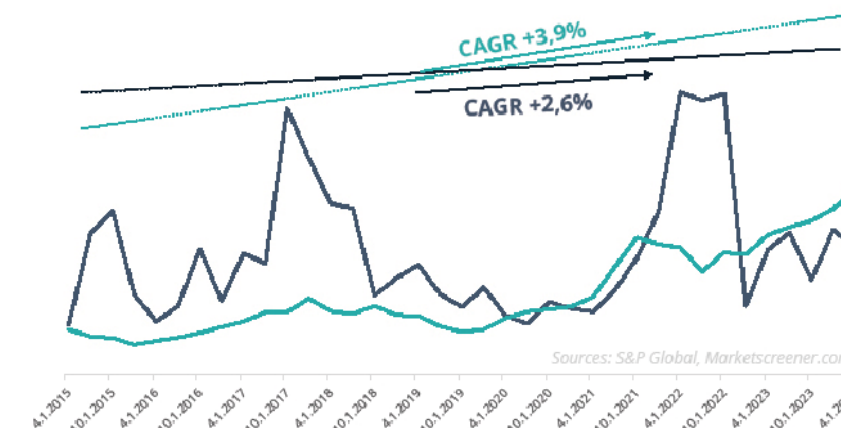
### Key results of the program

- ✓ 293 cities took part
- ✓ 18,500 projects launched
- ✓ >33,500 citizens' ideas, 30% of which were taken into account by city administrations in the implementation of projects

## The trend is to invest in «environmental» companies in India. Indian stock exchange indices in 2015-2024.



«environmental» companies



- Since 2023, the weighted average yield of Indian «environmental» companies has been ahead of the profitability of «non-environmental» companies (in the 1st quarter of 2024 by 1.5 times)
- The weighted average yield of «environmental» companies is more resistant to market fluctuations than «non-environmental» companies



«non-environmental» companies

Sources: S&P Global, Marketscreener.com

# AIR QUALITY MANAGEMENT IN A MEGALOPOLIS AS A KEY ELEMENT OF A «SMART CITY» CONCEPT

Pavel Viktorovich  
Glotov

airvoice

CityAir

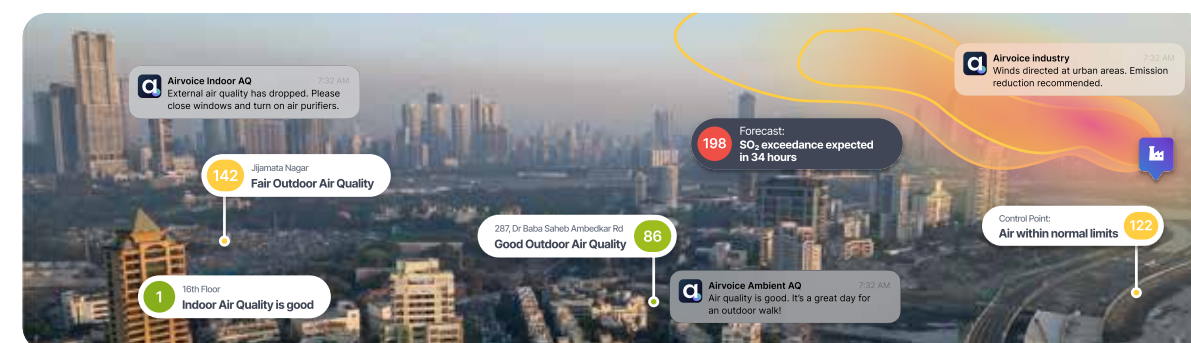
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dnair

airvoice.global

## Smart Air Quality Practices in Russia and India

Shimla, June 14, 2024



## Summary

1

From Air Treatment  
Devices to a Holistic Air  
Management System



**Dmitry Trubitsyn**  
Tech Entrepreneur,  
Airvoice Co-Founder

2

Adopting Air Quality  
Solutions in Urban Areas  
and Industries: Russian  
Case Studies



**Pavel Glotov**  
CityAir  
General Director

3

Addressing Indoor Air  
Quality Issue in India



**Ashwini K. Channan**  
Intelligent CityAir India  
CEO



# From Air Treatment Devices to a Holistic Air Management System



**Dmitry Trubitsyn**

Tech Entrepreneur, Airvoice Co-Founder

## Who We Are

We develop advanced solutions for air quality monitoring and management at any scale, from rooms to cities.

Our approach is grounded in scientific research and knowledge, aimed at benefiting society.

**17+**  
years in the industry

Headquarters  
in Gurugram, India

New Delhi • Moscow • Dubai • Belgrade

**50+**  
projects globally

Joint research with leading  
universities worldwide

## Clients & Partners

### Telecom



### Industry



### Government



### Science



## 17 Years of Company Evolution: Key Milestones



## Holistic Approach to Ensuring Healthier Air across Cities, Industries, and Buildings

Our advanced solutions help people breathe clean air

### Air Quality Monitoring Systems **airvoice**

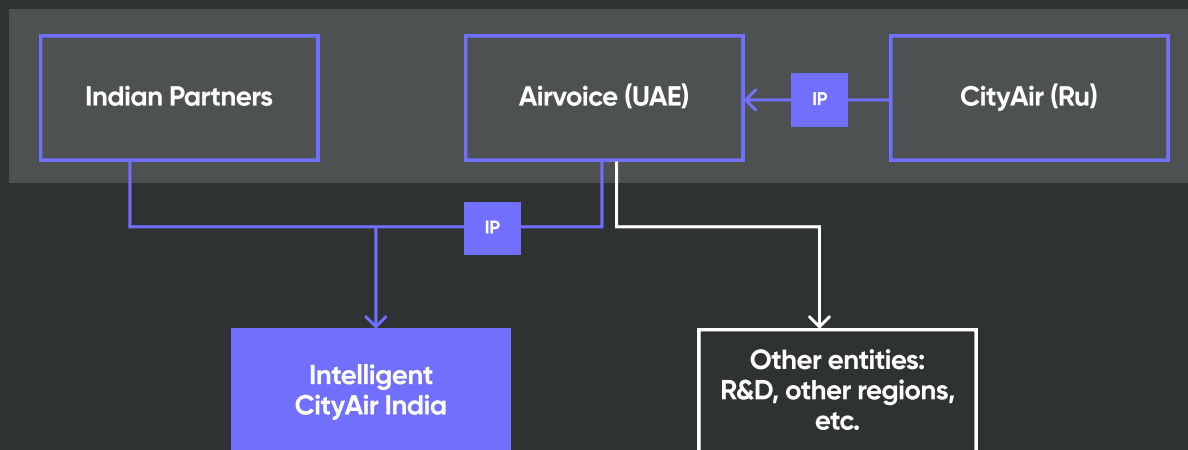


### Air Supply & Purification Solutions **dnair**



## Airvoice's Strategic Business Relationships

06



Smart Air Quality Practices in Russia and India

08

## Adopting Air Quality Solutions in Urban Areas and Industries: Russian Case Studies



**Pavel Glotov**  
CityAir General Director

airvoice

airvoice.global



in trubitsyn-dmitry

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## Enhancing Environmental Management in Sakhalin Region (1/2)

09

Use case

### Project Overview

CityAir installed 34 monitors across 23 Sakhalin locations, providing vital air quality data to enhance the region's ecology. Open communication of AQ data fosters public trust and boosts the region's tourism appeal.

### Objectives

- Establish **comprehensive AQ monitoring** throughout Sakhalin, including hard-to-reach areas
- Improve **public health, awareness, and safety** with real-time air quality updates
- Boost the **region's appeal as a tourist destination** by ensuring a clean and safe environment



## Enhancing Environmental Management in Sakhalin Region (2/2)

10

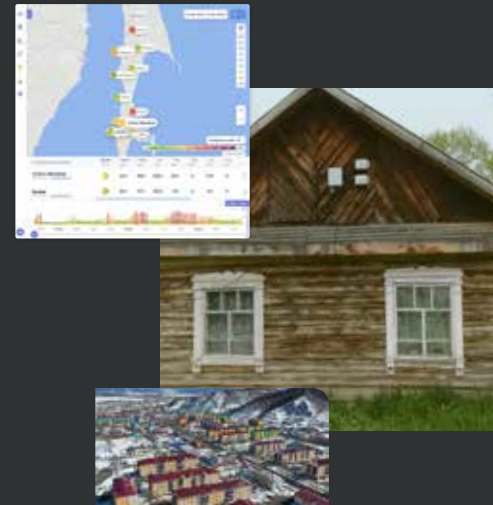
### Use case

### Solution

- Deployed a network of 34 CityAir monitoring stations in 23 locations, including remote areas like Okha and Severo-Kurilsk
- Created an open air quality map with a user-friendly index on the regional portal
- Provided authorities with access to detailed air quality analytics for informed urban planning

### Results

- Real-time data enable **proactive air quality management** (e.g. street cleaning)
- Increased **public awareness and engagement**, contributing to public health improvements
- Enhanced Sakhalin's reputation as a clean region and **attractive tourist destination**



## Establishing an Advanced Dust Management System at a Coal Loading Terminal (2/2)

12

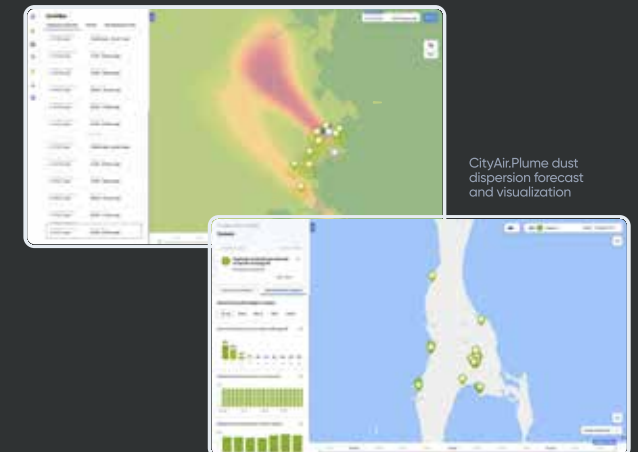
### Case Study

### Solution

- Deployed a network of CityAir stations for **continuous dust level monitoring** within and around the terminal.
- Utilized CityAir.Plume software to **forecast dust dispersion** and adjust suppression strategies based on real-time data.
- Developed **communication tools** to share air quality data with the community.

### Results

- Successfully **managed dust dispersion**, maintaining operations during adverse weather.
- Ensured **regulatory compliance** through accurate, real-time environmental data.
- Transparent communication **enhanced public trust** and the company's reputation.



## Establishing an Advanced Dust Management System at a Coal Loading Terminal (1/2)

11

### Case Study

### Project Overview

A leading stevedore company implemented a comprehensive air quality monitoring system alongside CityAir's emission dispersion modeling tools. This enhanced dust management, ensured compliance, and addressed public concerns about air quality.

### Objectives

- Overcome **dust suppression challenges** during extreme cold to ensure the effectiveness of measures
- Meet **environmental regulations** and provide data to demonstrate compliance
- Maintain **transparent communication** with the local community about air quality and dust management efforts



## Air Quality Management Initiative at Norilsk Nickel (1/2)

13

### Case Study

### Project Overview

Norilsk Nickel, a global leader in metals and mining, implemented an air quality monitoring and management system in Norilsk to effectively control air pollution, reduce emissions, and ensure compliance with environmental regulations.

### Objectives

- **Reduce emissions** while maintaining some of the industry's lowest emission levels.
- **Enhance air quality** in Norilsk and the Kola Peninsula through advanced monitoring tools.
- **Commit to global disclosure standards** to improve public and government relations.





## Air Quality Management Initiative at Norilsk Nickel (2/2)

14

### Case Study

#### Solution

- Installed a dense network of compact CityAir monitors along the perimeter and in Norilsk.
- Integrated CityAir software suite to forecast pollutant dispersion.
- Developed a unique air quality index tailored to operational specifics of Norilsk Nickel.

#### Results

- Real-time air quality monitoring and analytics enable informed decisions for effective pollution mitigation.
- The system aids in assessing improvement initiatives, ensuring ongoing optimization.
- Transparent data communication boosts public trust and enhances the company's reputation.



## Dynamic Assessment of Vehicular Emissions Impact on Air Quality in Moscow (2/2)

16

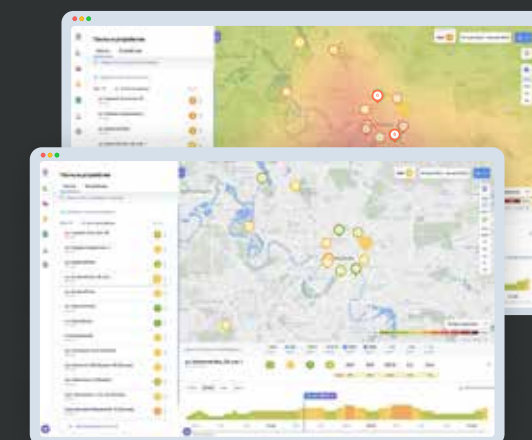
### Case Study

#### Solution

- Develop a system to **evaluate the impact of Moscow's traffic** on ambient air using real-time congestion data.
- Incorporate CityAir.Lens for **high-resolution (70x70 meters) air quality mapping** and forecasting.
- Provide access to AQ data through a public web portal and API connectivity with external systems.

#### Results

- A detailed interactive map of vehicular impact on air quality significantly aids in urban planning and public health management.
- Data is available to the public and authorities, increasing transparency and facilitating informed responses to air quality issues.



## Dynamic Assessment of Vehicular Emissions Impact on Air Quality in Moscow (1/2)

15

### Case Study

#### Project Overview

We have developed a solution to dynamically assess the impact of vehicular emissions on Moscow's air quality. The goal is to manage traffic emissions by optimizing parking and road fees and coordinating street repairs, ultimately enhancing urban ecology.

#### Objectives

- Implement software to assess the environmental impacts of changes in road capacity and traffic management.
- Seamlessly integrate real-time pollution data with Moscow's urban planning information systems.



## Using Kick Scooters as Mobile Air Quality Monitoring Stations (1/2)

17

### Case Study

#### Project Overview

Whoosh and CityAir launched electric scooters equipped with air quality sensors in a city to collect extensive environmental data.

#### Objectives

- Provide comprehensive air quality data across the city in real time.
- Test mobile monitors for reliable hyperlocal air quality mapping.
- Enhance urban air quality management and support data-driven urban initiatives.



## Using Kick Scooters as Mobile Air Quality Monitoring Stations (2/2)

18

### Case Study

#### Solution

- Fitted eight scooters with mini sensor boxes to measure dust and nitrogen dioxide.
- Engineered vandal-proof housing and a compact, scooter-powered monitoring system.
- Processed and transmitted air quality data in real-time via a cloud platform.

#### Result

- Scooters covered extensive city areas, collecting data at 1,000,000 points in one week.
- Visualized data using a color-coded AQI on a detailed city map.
- Offered granular insights into urban pollution, influencing city planning and public health strategies.



## Implementing an Odor Monitoring System for a Livestock Enterprise (2/2)

20

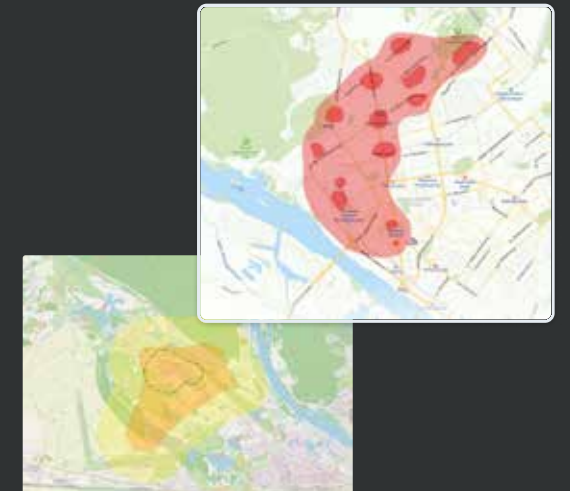
### Case Study

#### Solution

- Installed a network of CityAir monitors to continuously track odour-related pollutants like hydrogen sulfide and ammonia.
- Integrated CityAir.Plume software to predict odour dispersion based on real-time data.
- Implemented air quality data communication through a city web portal, with clear air quality indices.

#### Result

- Accurate monitoring and predictive tools allowed the farm to proactively manage odour emissions.
- Addressed community and authorities' concerns regarding smells.
- Enhanced public trust through transparent communication.



## Implementing an Odor Monitoring System for a Livestock Enterprise (1/2)

19

### Case Study

#### Project Overview

A livestock enterprise, the largest pork producer in the Novosibirsk region, implemented an odour monitoring system to determine its impact on air quality and address community concerns about unpleasant smells in the city.

#### Objectives

- Determine the extent of odour impact from the livestock operations on the surrounding community.
- Implement forecasting tools to predict and tackle potential odour issues by .
- Enhance transparency with local residents and bodies



### Smart Air Quality Practices in Russia and India

21

## Addressing Indoor Air Quality Issue in India



**Ashwini K. Channan**  
CEO of Intelligent CityAir India

# 5 facts about indoor air quality (IAQ) and safety management

22

1

90%  
of their lifetime people spend indoors

2

14 kg  
of air a person inhales every day

3

Indoor air is 5 times more polluted than it is outside

4

Air quality directly affects human health, well-being, and productivity\*

5

Indoor climate technologies are the largest energy consumers\*\*

\* According to the WHO, indoor air pollution is the major risk factor for human health. Indoor pollutants increase the risk of allergic reactions and cancer (https://www.epa.gov/indoor-air-quality-iaq/introduction-indoor-air-quality). The human cognitive ability significantly decreases at high levels of CO2. At the same time, ensuring optimal indoor air parameters reduce sick-leave costs. (Joseph Allen et al. Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environments).

\*\*The operation of air conditioners and electric fans accounts for about a fifth of the total electricity used in buildings around the world – or 10% of the global electricity consumption today (https://www.iea.org/news/air-conditioning-use-emerges-as-one-of-the-key-drivers-of-global-electricity-demand-growth)

# Indoor air quality can be managed for the benefit of employees, businesses, and buildings

23

- Air quality data can be digitized and visualized
- Good air quality can be achieved with adequate energy efficiency
- Healthy and comfortable indoor environment is a solid competitive advantage for buildings and businesses



# The AirVoice.Indoor solution includes

24

Continuous IAQ monitoring software platform

Verified sensors to measure pollutant concentrations and climate parameters

Approved air purification and disinfection systems

Cutting-edge algorithms for data interpretation and management





Integration with BMS

Tools to communicate air quality data to stakeholders

# Air Quality Indexes

25

The Indoor Air Quality Index (IAQI) is calculated based on the real-time data on pollutant concentrations

AirVoice indexes	Integrated indexes	
<ul style="list-style-type: none"><li>IAQI (based on the EPA recommendations)</li><li>AQ Safety</li><li>AQ Comfort</li></ul>	<div> RESET® Viral Index</div>	<div><div><div> Breathe Safety Index</div><div> UPSTATE Author of methodic Usha Satish, Professor Psychiatry and Behavioral Sciences</div></div><div><div> 5 Years IOM Reviewer Lang Tran, Professor Director of Institute Occupational Medicine</div></div></div> <ul style="list-style-type: none"><li>Productivity</li><li>Health risks</li><li>Life quality</li></ul>

The air quality indexes used on AirVoice.Indoor are based on research papers from top universities from all over the world





## Map and dashboards to control air quality at each room in real time

26



## Verified indoor AQ sensors integrated in the AirVoice platform

28

Real-time monitoring and cloud storage for analysis

Tracking key pollutants and environmental parameters that influence indoor air quality and comfort

Particulate matters  
PM2.5 and PM10

Carbon dioxide  
CO<sub>2</sub>

Environmental parameters  
Temperature, humidity

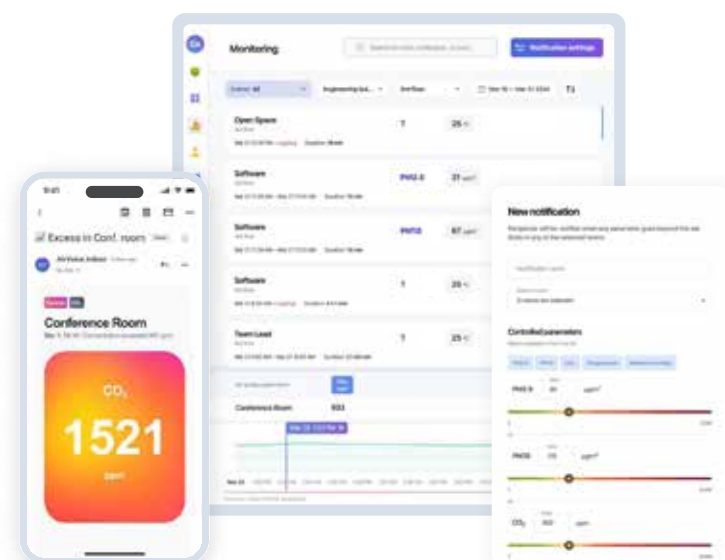
Total organic volatile compounds  
TVOCs



## Notifications

27

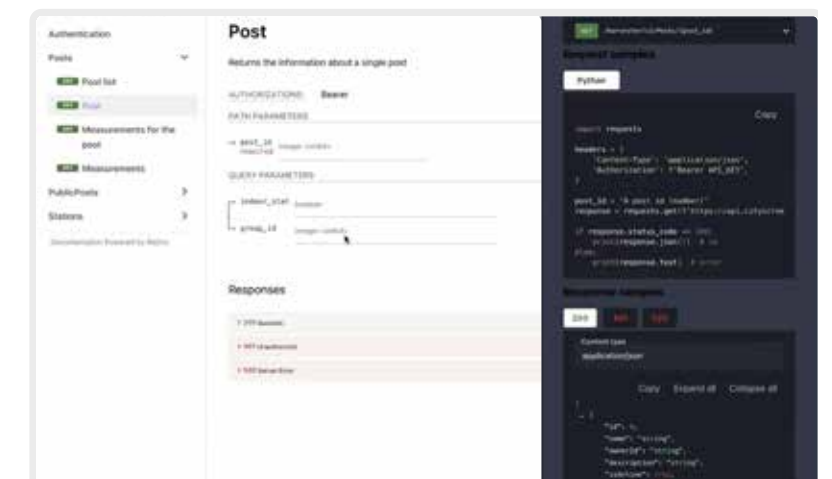
Personalized real-time notifications of changes in the air quality to take immediate remedial actions



## Other platform features

29

- Seamless integration with BMS/BAS and air handling, treatment, and conditioning systems
- Advanced flexible API for complete customization



## Communicating High Air Quality Standards

30

### Comparative dashboards:

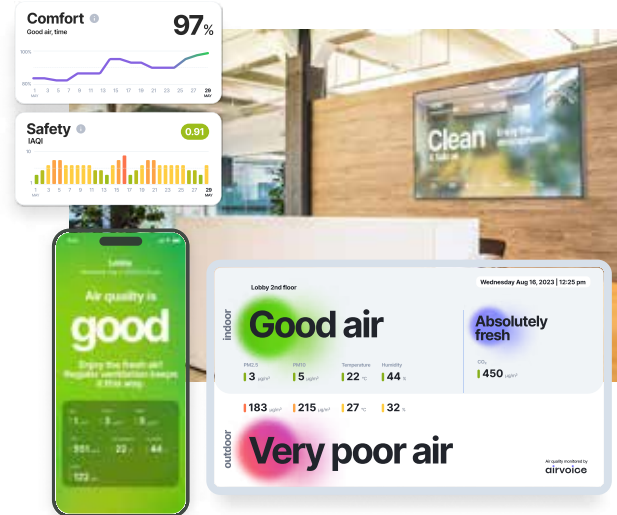
Display superior indoor air quality versus outdoor, crucial in polluted region

### Tailored widgets:

Integrate real-time air quality data into your website or app

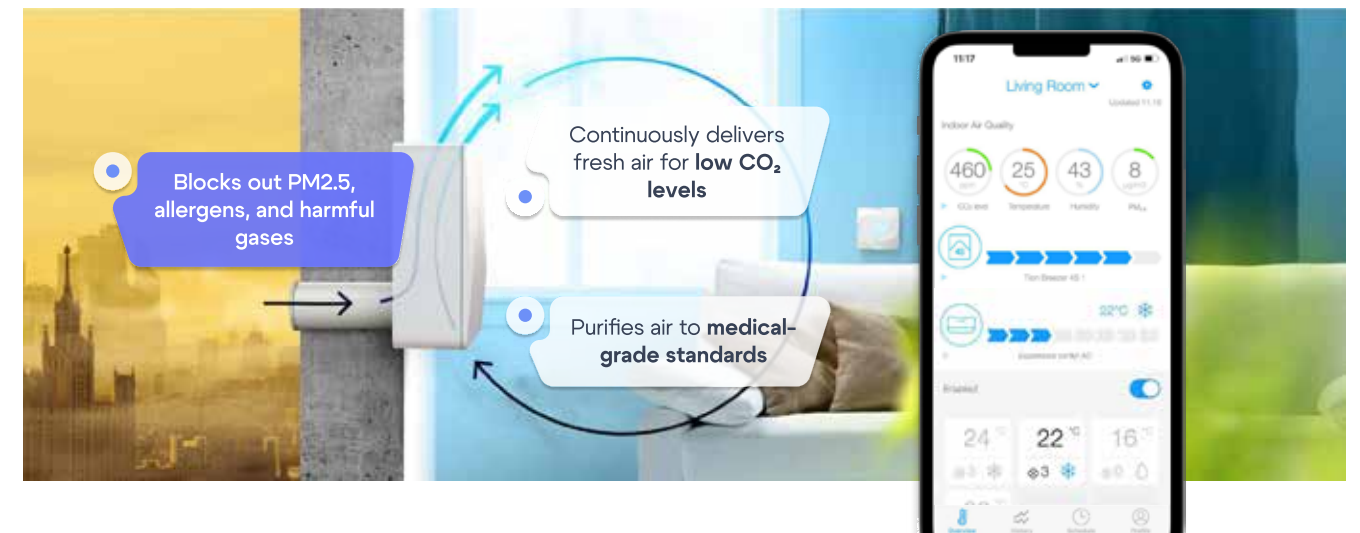
### Diverse visualization formats:

View air quality, safety, and comfort levels, emphasizing health and productivity benefit



## Breezer – Compact Supply Ventilation Unit for Homes and Offices

32



## Breezer – Compact Supply Ventilation Unit for Homes and Offices

31



**24/7 Ventilation**  
with windows closed

**No Odors**  
Protects from odors and harmful gases

**Noise Isolation**  
Cuts down on external noise

**Clean Air**  
Filters out PM 2.5

**Blocks Allergens**  
Captures pollen, fluff, and animal dander

**Easy Control**  
via the MagicAir mobile application

## Three-Stage Filtration System for Air Purification and Disinfection

33

Purifies and Decontaminates Air to Medical-Grade Standards

### Adsorption filter

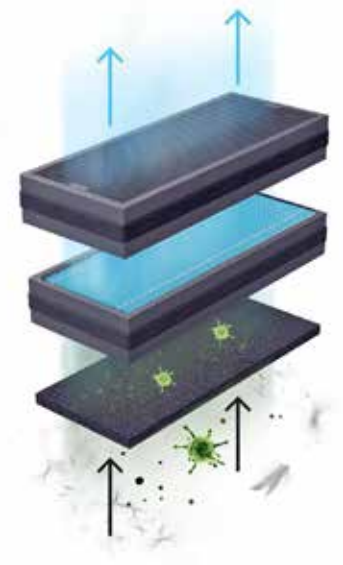
Ensures purification from outdoor gases, smoke, and odors

### HEPA H13 filter

Traps fine dust particles (PM2.5, PM10) and allergens, equipped with an antimicrobial layer for inactivating germs with a 99.99% efficiency rate

### G4 Primary Air Filter

Captures coarse dust, soot, and fluff, acting as the first line of defense against pollutants



## Ensuring a Safe and Comfortable Environment at Home

Use case

### Project Goals

- Establish a safe and healthy air environment for better wellbeing and comfort of all family members
- Prevent allergens, dust, harmful gases, smoke, and noise coming from the outside
- Clean indoor air of TVOCs, allergens and other pollutants

### Solution

- Install Breezers in each room to ensure optimal air parameters
- Install the app to monitor and control Breezer operation depending on the occupancy and desired comfort level



For homes 34

## Optimizing Work Environment for Productivity

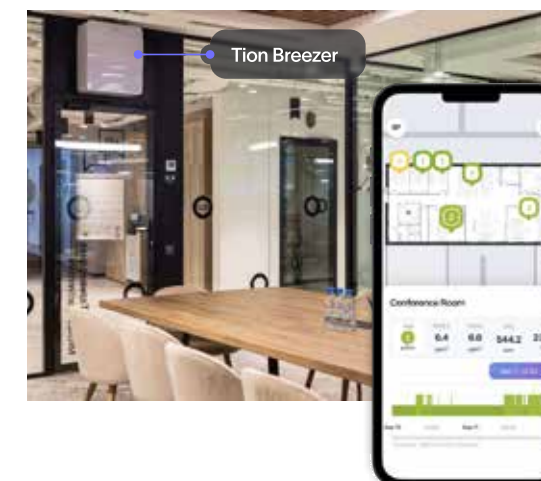
Use case

### Objectives

- Ensure perfect air quality to enhance working performance, reduce sick leaves and absenteeism
- Communicate employees about air quality through a web or mobile application
- Build an image of a sustainable and responsible business and track ESG metrics

### Solution

- Install Breezers in each room to ensure optimal air parameters and connect them to the IAQ monitoring platform
- Install the app to control Breezers' operation depending on the occupancy and save energy
- Present occupants with immediate air quality updates via accessible dashboards and widgets.



For offices 36

## Improving Conditions for Better Learning in Schools

Use case

### Objectives

- Establish a healthy air environment for better learning and standards compliancy
- Provide a centralized IAQ control system for school management

### Solution

- Implement the indoor air quality monitoring system to view AQ data
- Install Breezers in each classroom to ensure optimal air parameters
- Control Breezers' operation depending on the occupancy



For schools 35

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in Ashwini K Channan

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### Airvoice India

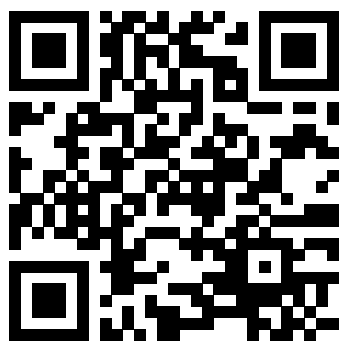
74, Royalton Tower, Princeton Estate, Club Drive,  
DLF Phase V, Gurugram, Haryana-122009



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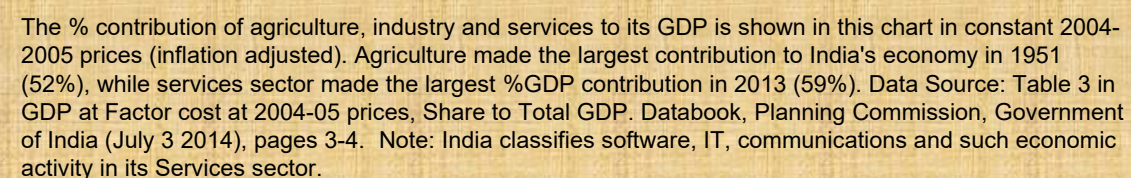
[linkedin.com/airvoice-avms](https://www.linkedin.com/company/airvoice-avms)

#### Airvoice India

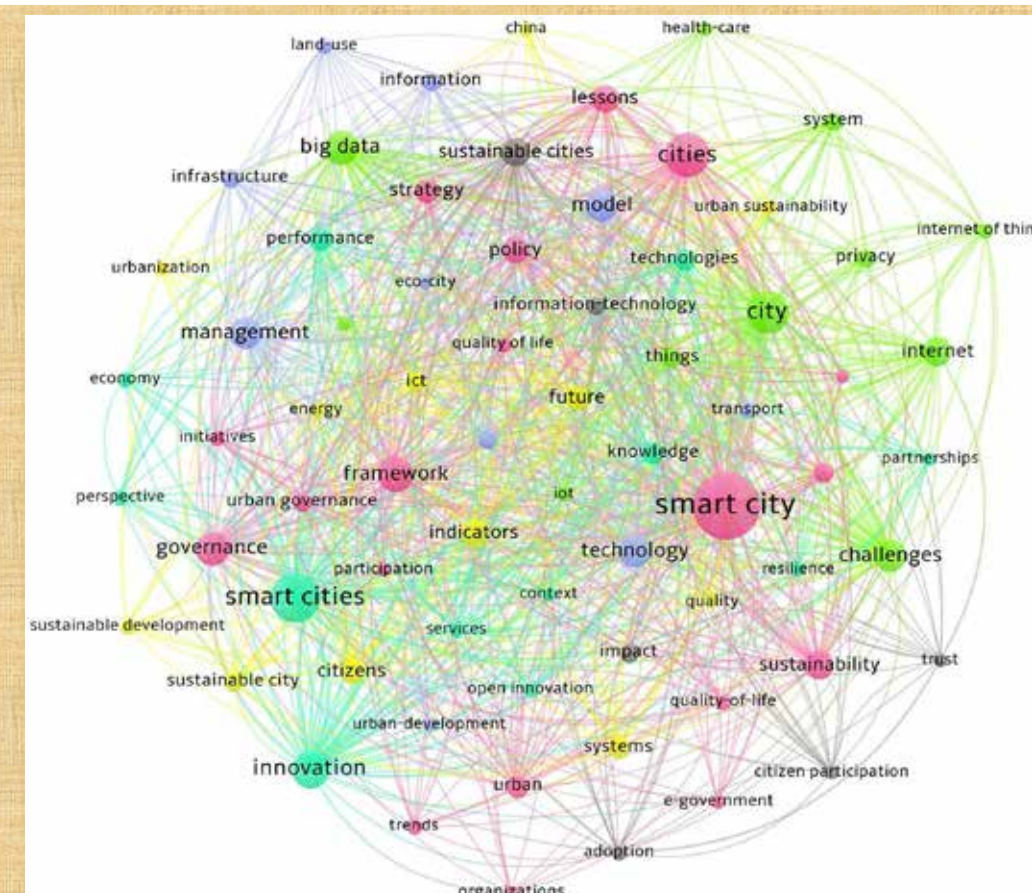
74, Royalton Tower, Princeton Estate, Club Drive,  
DLF Phase V, Gurugram, Haryana-122009  
+91 7683 045 836

# COPING WITH URBAN CHALLENGES THROUGH SMART CITIES IN INITIATIVES: STRENGTHENING TECHNICAL AND FINANCIAL COLLABORATIONS BETWEEN INDIAN AND RUSSIAN CITIES TO PROMOTE URBAN SUSTAINABILITY

Shimla



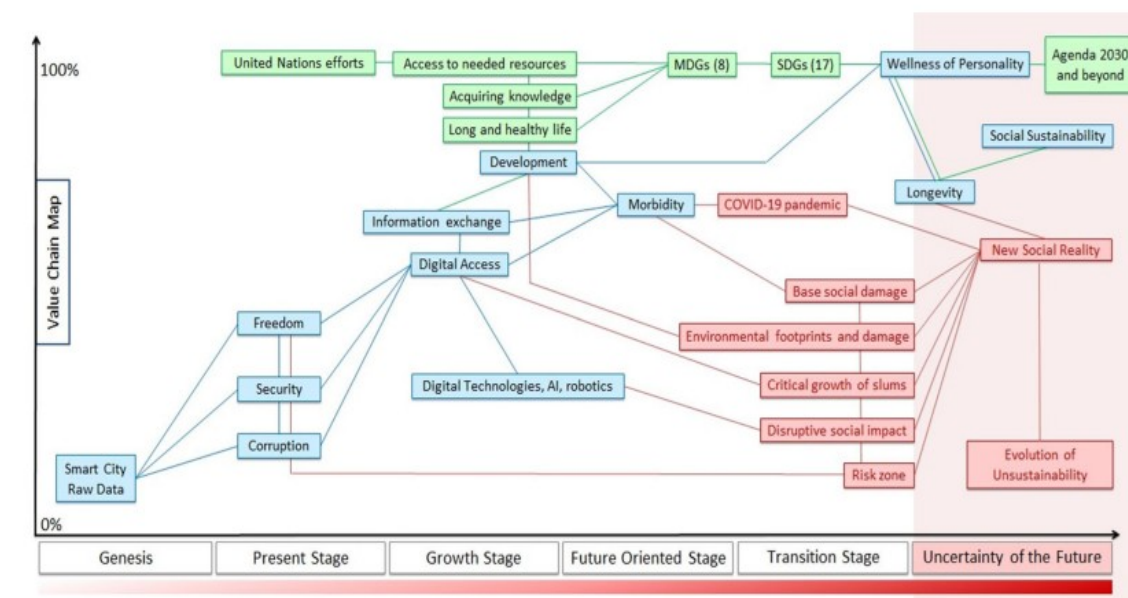
Climate change  
mitigation  
&  
Resilience





Sustainability Science (2021) 16:581–599

587



**Fig. 3** The Value Chain Map for results of text Big Data analytics (Google API) related to Sustainable Development Goals. Blue boxes and lines—the chain based on revealed by API-sociology combined global social topics. Green boxes and lines—the reflection of the

global approach of the United Nations for sustainable development. Red boxes and lines—the worst scenarios, threats, and challenges. *MDGs* Millennium Development Goals, *SDGs* Sustainable Development Goals

“India will experience the largest wave of urbanization in the world, over the next two decades. It is a challenge, but also a huge responsibility and opportunity.”<sup>5</sup>

**Shri Narendra Modi,**  
Prime Minister, India



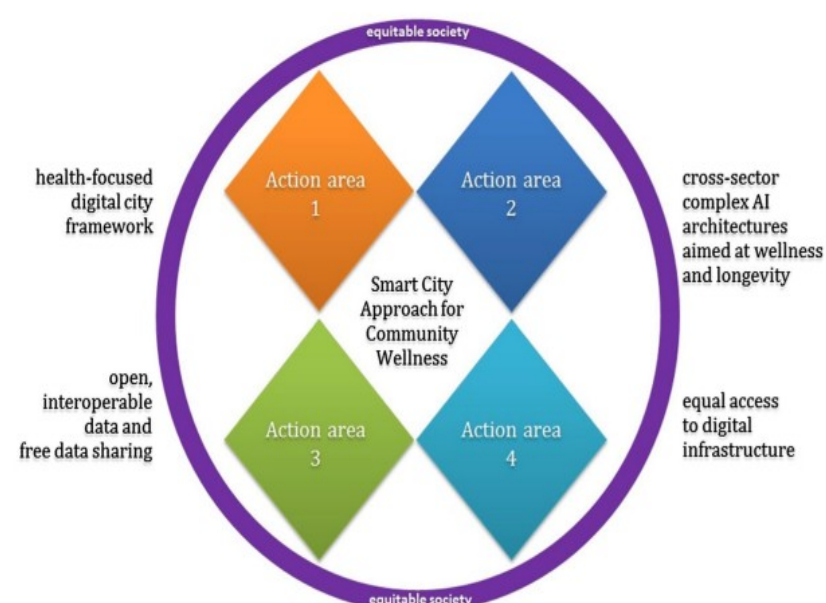
The Smart Cities Mission (SCM) is one such initiative that offers low-carbon, people-centric approaches for the enhancement of urban infrastructure and services. It has pioneered and mainstreamed the use of digital technologies to improve the quality of life and ease of doing business in urban areas.



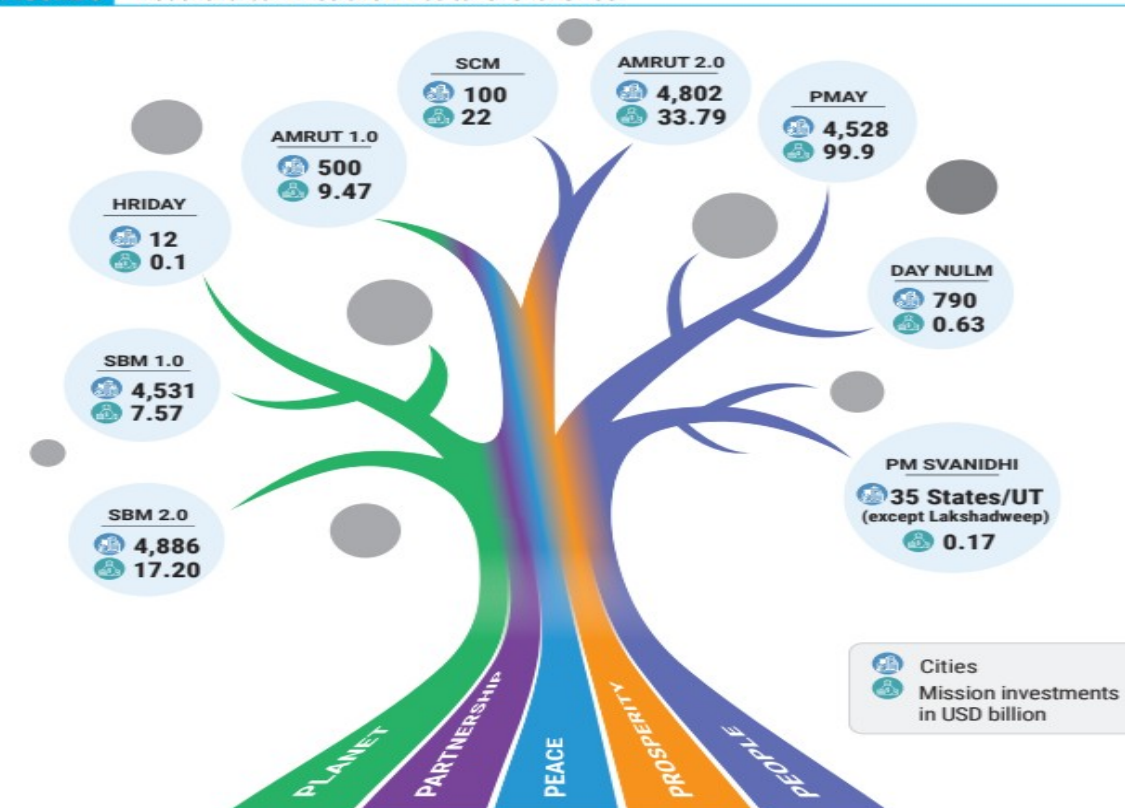
592

Sustainability Science (2021) 16:581–599

**Fig. 5** Smart City Approach for Community Wellness – Culture of Health Action Framework adapted for Smart City. Primary Culture of Health Action Framework was developed by Robert Wood Johnson Foundation & RAND Corporation (Acosta et al. 2016; Plough et al. 2018)

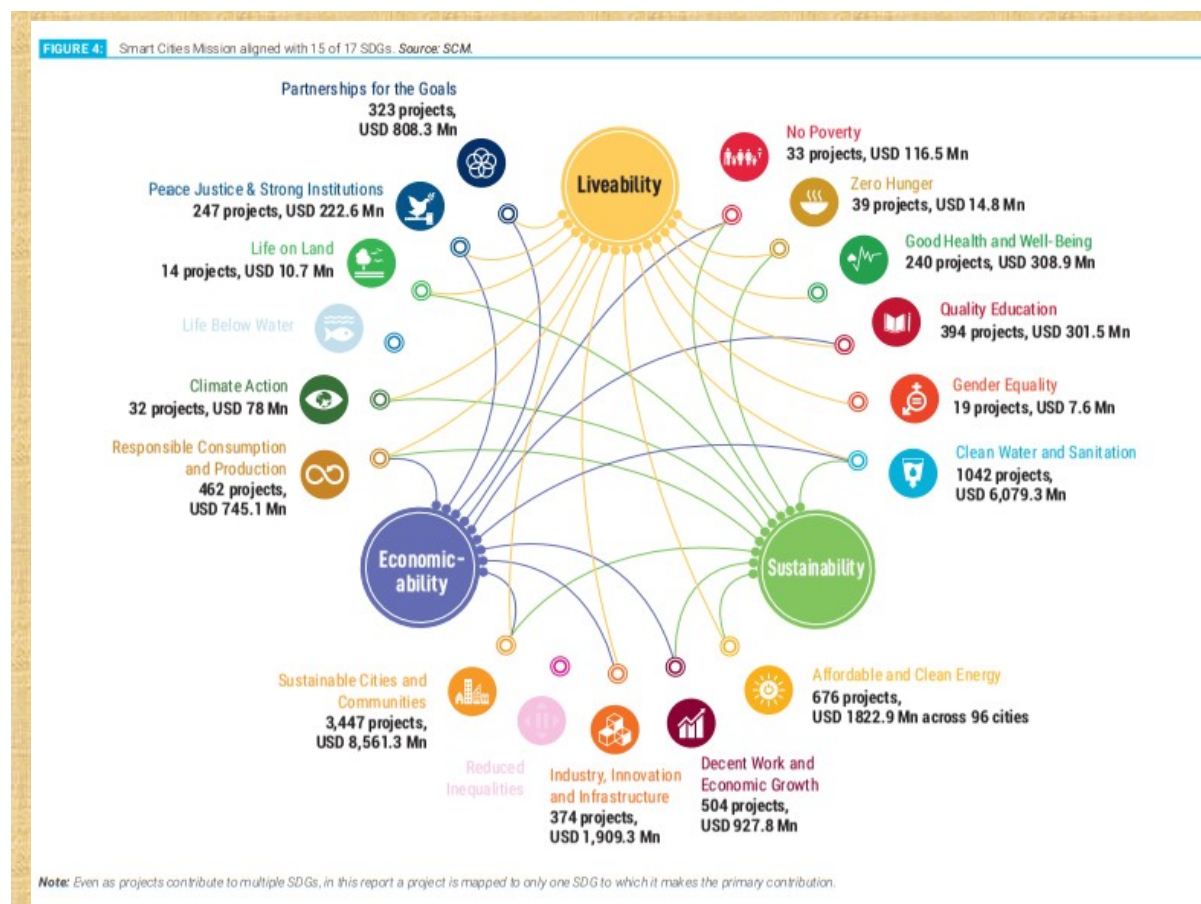


**FIGURE 3** National urban missions linked to “5Ps” of SDGs.



**Note:** HRIDAY, implemented by MoHUA earlier, is now under Ministry of Tourism.





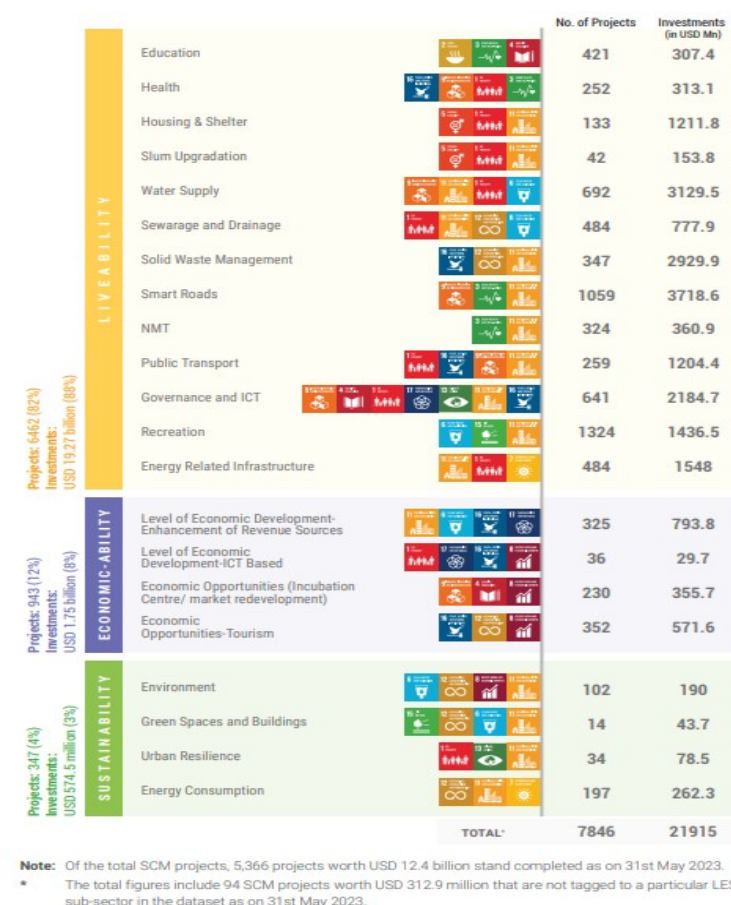
## SDG 6 CLEAN WATER & SANITATION: Projects and Achievements



Insights into SCM and SDG Localization

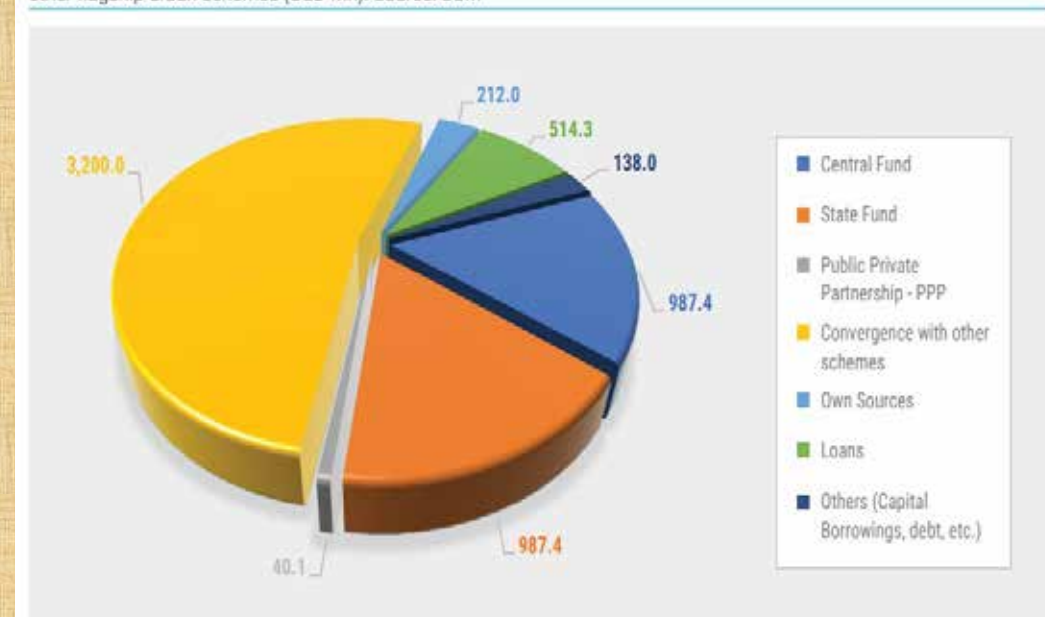
**FIGURE 16:** Projects under SCM are categorised under 21 distinct sectors, with each sector contributing to multiple SDG goals and aligned with one of the three pillars of Liveability, Economic-ability, and Sustainability.

Source: SCM and UN-HABITAT



## Financing of SDG 6 CLEAN WATER & SANITATION

**FIGURE 17:** Sources of funds for projects under SDG 6. More than half of the funds were mobilized in convergence with other flagship urban schemes (USD Mn). Source: SCM





## Urbanisation in India

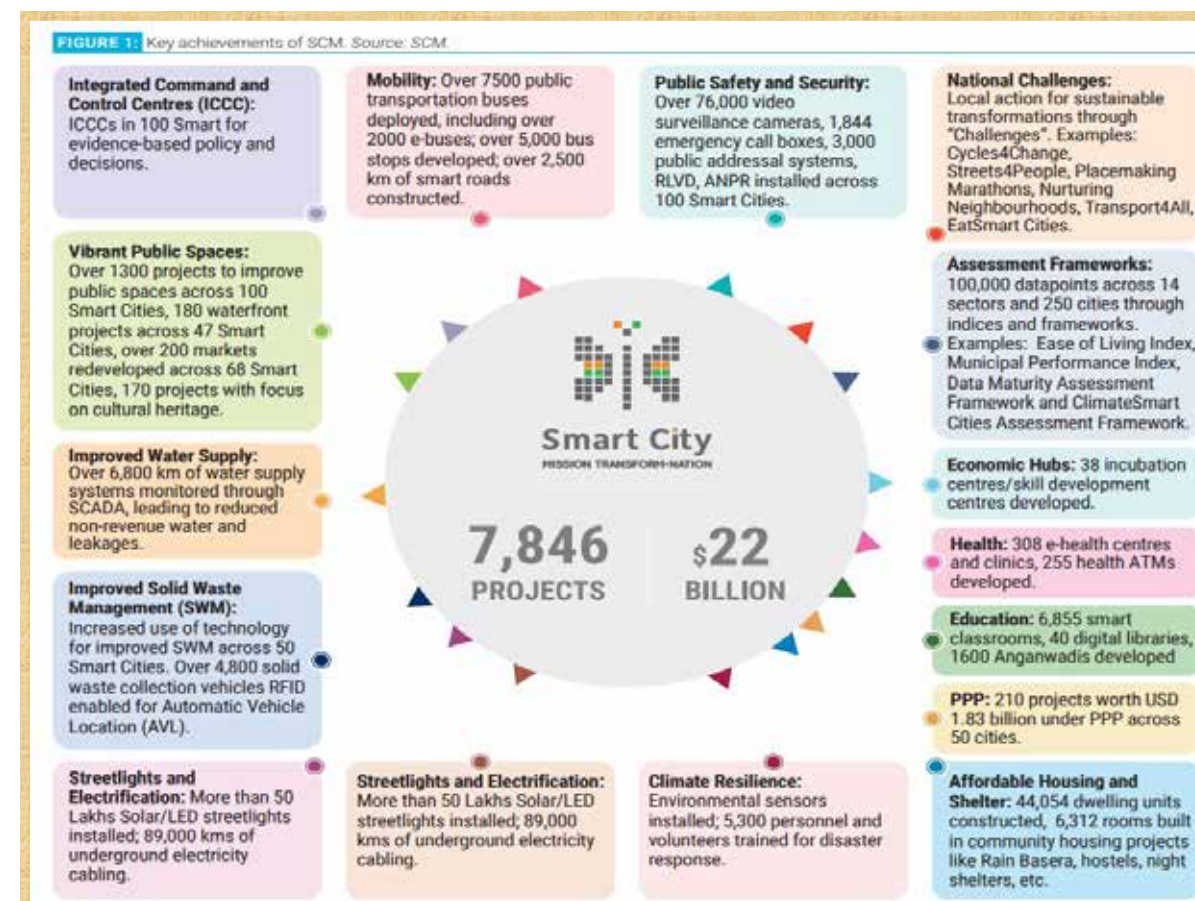
- India's urbanisation story is one that is unprecedented with 483 million (34.9 per cent) people living in cities in 2020, and the share is expected to rise to 43 per cent in 2035. Nearly 60 per cent of India's carbon emissions by 2030 will come from "buildings and factories that are yet to be built, and vehicles and appliances that are yet to be bought."
- India is at an important crossroads where the design of its cities and urban centres may determine how its growth story unfolds.
- India is a signatory to the 2030 Agenda for Sustainable Development and has committed to achieving inclusive, safe, resilient, and sustainable communities and settlements.

## 100 Smart Cities (54% Urban Population): 7800 Projects with Investment of USD22 Bn.

- The 100 Smart Cities are representative of India's urban geography. The share of intermediary cities, with population between 100,000 to 1,000,000 persons, stands at 54 per cent. SCM offers a unique scale for SDG localization: the mission has undertaken over 7,800 projects across 100 cities since its inception in 2015 and directed an investment of over USD 22 billion. These projects fall under the ambit of area-based developments (60 per cent of total projects) and pan-city smart solutions (40 per cent), which focus on the entire city, so no space is left behind, and all communities benefit from the mission's investments. The largest share of projects and investments are directed towards basic infrastructure and services which seek to improve the liveability outcomes in the emerging urban areas.

## SCM is a unique case study of SDG localization

- SCM is a unique case study of SDG localization. The three pillars of the mission—Liveability, Economic-ability, and Sustainability—are aligned with 15 out of the 17 SDGs. Nearly 44 per cent of the total SCM projects contribute to SDG 11 (Sustainable Cities and Communities). SDG 6 (Clean Water and Sanitation) has the second largest share of projects at 13.3 per cent, followed by SDG 7 (Affordable and Clean Energy) at 8.6 per cent, and SDG 8 (Decent Work and Economic Growth) at 6.4 per cent.





## Pragmatic use of Artificial Intelligence in Smart Cities

### Artificial intelligence is everywhere

#### Market Verticals

- Healthcare
- Transportation
- Manufacturing
- Financial
- Education
- Legal
- Agriculture
- Entertainment / Gaming
- Retail
- Media/Social
- Security
- Home

With artificial Intelligence, we go from

Reporting what happened in the past

Predicting the future

Predicting the future is dependent on "learning" from the past

### Big data

Successful AI predictions are dependent on data.

- The Industrial IoT (IIoT) is a natural source of valuable data
- This resultant symbiotic relationship between AI and the IIoT augments the predictive capabilities of AI

One value of "big data" lies in its ability to influence AI decisions.



One way of doing this is by broadening the "knowledge" in the system through additional data sets.

### Summarizing the four essential steps to AI

#### 1 Data Acquisition

Lots of data

Acquiring data is the essential 1<sup>st</sup> step in the decision process.

#### 2 Knowledge

Recognition of different patterns

Extracting knowledge, to derive the meaning behind the data, is essential.

#### 3 Intelligence

Understanding the behavior behind the patterns

Getting to Intelligence by analyzing the causes, changes and effects to such patterns

#### 4 Wisdom

Ability to anticipate and react

The system develops "predictive" abilities, based on the ability to apply intelligence



### The Internet of Things (IoT)

Every prediction in IoT talks about billions of things and trillions of dollars

billion devices by 2020

50

\$14.2

trillion by 2030

IoT

\$7.1

trillion by 2020

26

billion devices by 2020

Consumer IoT

Industrial IoT



Insights (AI) through big data is the underlying opportunity because of the IoT



## SMART CITIES | A vertical solution of the IoT



### Big data

Intelligence improves by integrating different types of data & logic

- eGov
- eHealth
- Asset Management
- Traffic Management
- Safety & Security Management
- Facilities & Buildings Management
- Sustainability Management

Where do you start?  
How do we get to a smart city?

## Russian partners likely to put some muscle into India's smart city projects

The special focus of the mission is Maharashtra, Madhya Pradesh, Tamil Nadu, Uttar Pradesh, Gujarat, Karnataka.



## “ The Smart Cities Mission (SCM) is a potential global exemplar of the best practices in the implementation of the SDGs and the New Urban Agenda. The mission has seamlessly translated the vision of sustainability into action in cities.

its impact across 100 cities. The dataset is complemented by stories of people and communities from SCM cities which appear across the SDGs chosen in the report for an in-depth review: SDGs 6,7,8,9,11, and 17.

SCM projects are organized across the themes of Liveability, Economic-ability, and Sustainability (LES). Its objectives were translated into investments and implementation through the institutional mechanism of Special Purpose Vehicles (SPVs) which complemented municipal bodies. SCM has thus delivered a blueprint for action for urbanizing cities across the world who can likewise adapt and empower their institutions to achieve the SDGs.

SCM through its institutional innovations and financial instruments has demonstrated a pathway for cities to gradually improve their revenues and enhance their financial autonomy. Further, nearly 66 per cent of SCM cities have a population of less than one million. For several such cities, SCM has turned out to be an important fiscal source to enhance the city's infrastructure. It is in such arenas that the quest for sustainable urban development will unfold in the coming years. These lessons and experiences from SCM will hopefully inspire emerging urban regions across the world to make cities a better place for their people and communities.

New Delhi  
July 2023

## India, Russia ink MoU for cooperation in smart cities scheme

PTI • Last Updated: Oct 18, 2016, 01:29:00 PM IST

FOLLOW US SHARE FONT SIZE SAVE

### Synopsis

The agreement was signed in Goa where Prime Minister Narendra Modi and Russian President Vladimir Putin held wide-ranging talks covering the entire expanse.

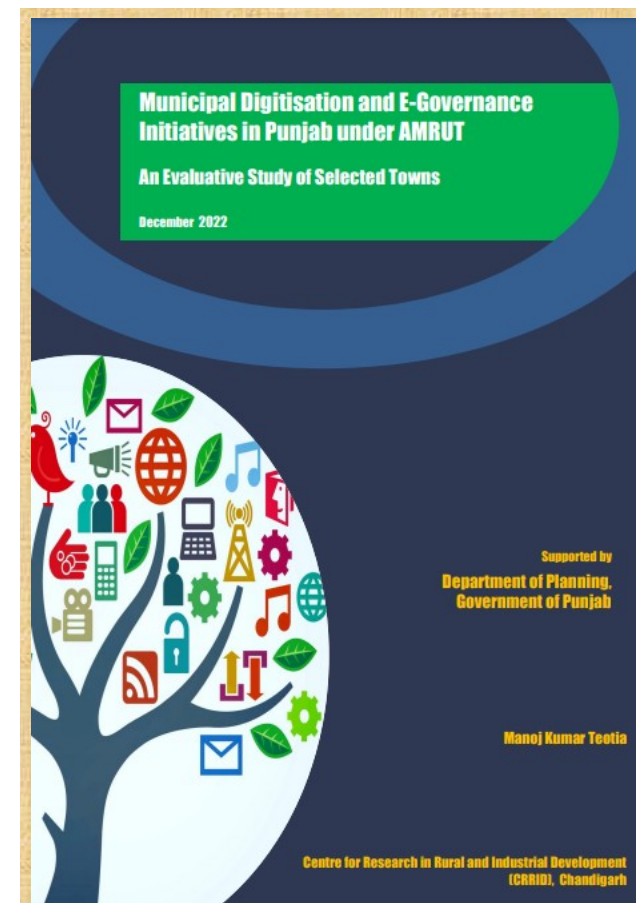


NEW DELHI: India today signed an agreement with Russia for cooperation in the implementation of 'smart cities' programme and use of IT solutions of the Russian companies.



## What Russia and India can do together for Smart Cities of Future

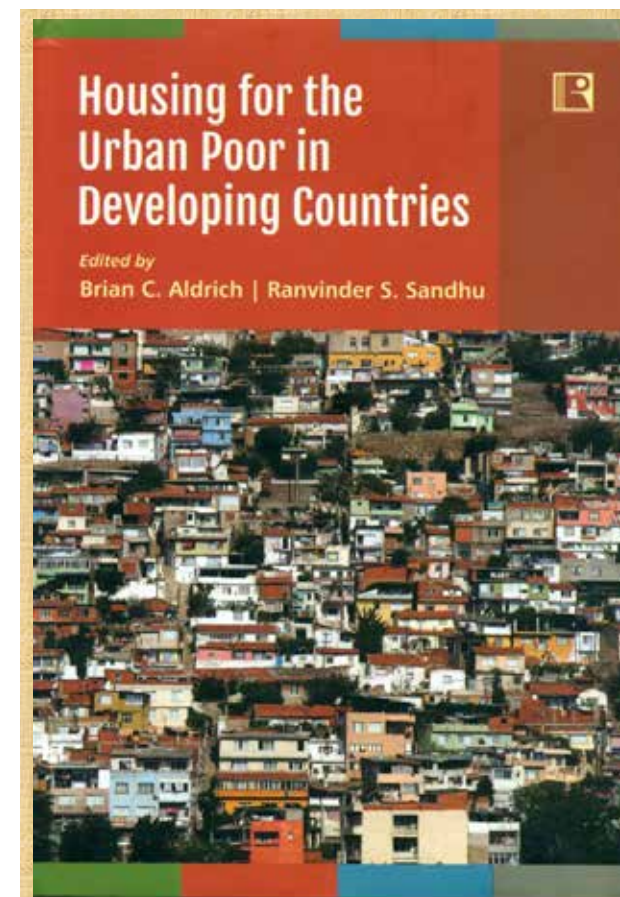
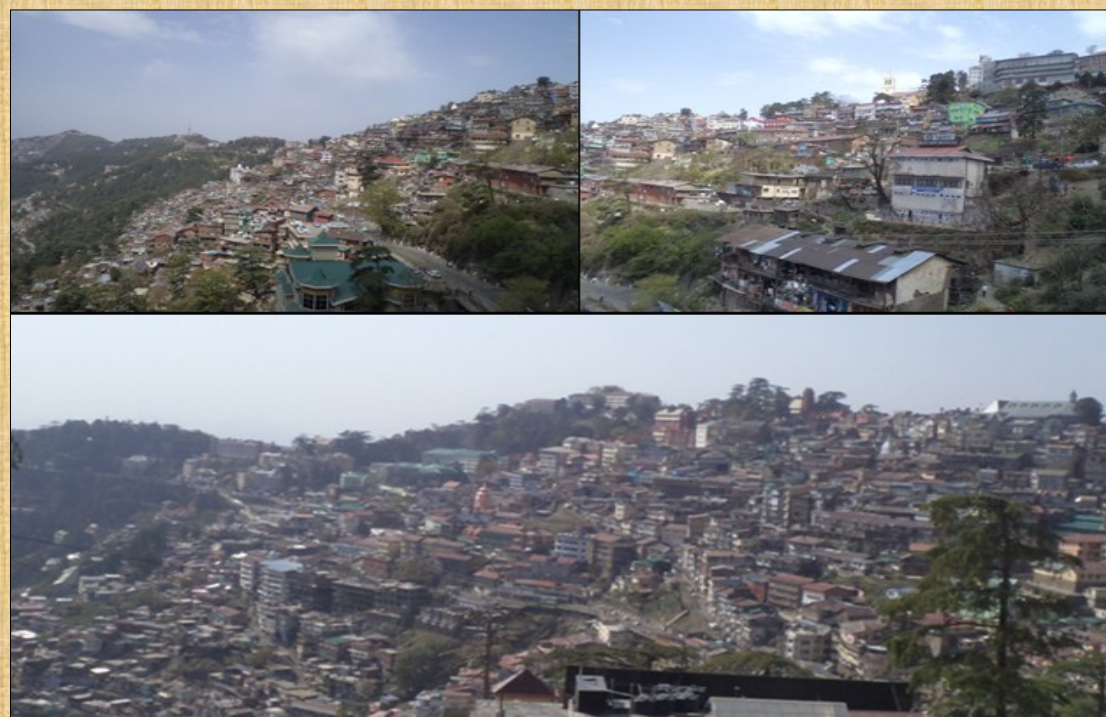
- Exploring avenues for joint projects which are environmentally sensitive, socially equitable and commercially viable and promotes good governance at city level
- Strategic and technical assistance and cooperation for designing and administering Smart City Projects
- Providing supports to help municipal officials and learn from each others smart cities experiences and also capacity building
- Galvanizing a network of urban practitioners to share mutually benefitting best practices and evidence in urban planning and smart solutions (Russian Indian Urban Forum and Smart City Labs)



### Municipal Digitization and E Governance in Punjab under AMRUT (2021) Manoj Kumar Teotia

1. Majority of poor residents not taking benefits due to lack of knowledge, low literacy and absence of apps in local languages
2. Digital Divide and Digital Literacy are the crucial issues
3. But majority feel that it is good and helping to reduce corruption
4. So the major challenge is to do complete digitalization at local level and make it people friendly and poor friendly

## Haphazardly Growing old Shimla



## 10 Housing for the Urban Poor in India

Emerging Trends and Issues

Manoj Kumar Teotia

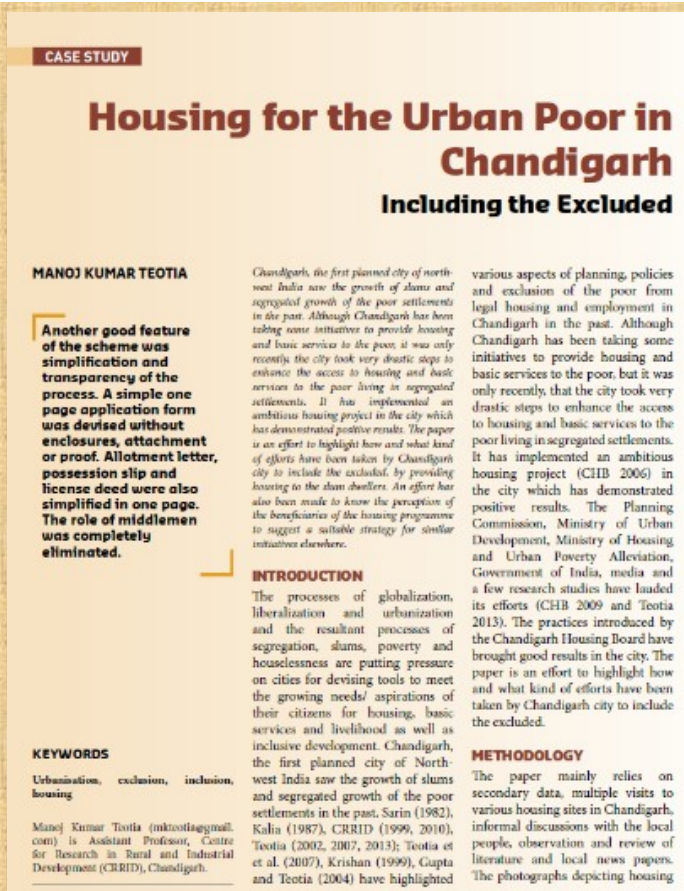
"We shape our dwellings, and afterwards our dwellings shape us."

—Sir Winston Churchill

India is the second largest urban system after China and housing is emerging as a major problem in urban India. The housing shortage in urban areas is growing and the situation seems to be worsening for the urban poor who either reside in slums or squatters. It has become a serious problem in the wake of rapid urbanization, commodification of land and housing, distortion in land market and the weakening of public sector housing provision in the post-liberalization period in India. The onset of liberal regimes in promoting development of real estate markets, beginning of low interest home loans, etc. seems to have made land and housing in urban areas a commodity for speculation. The private sector real estate builders, property dealers and rich individuals seem to have taken maximum benefit of the liberal housing markets, leaving no or negligible scope for the urban poor to buy a decent house in urban areas. Housing and urban development for the low income population seems to be neglected in urban policy planning over successive planning eras.

The world is urbanizing and in 2008, a turning point was achieved in human history when the number of people living in cities exceeded those in the countryside. Between 2007 and 2050, the world population is projected to increase from 6.7 to 9.2 billion and most of this growth will occur in the urban areas of less developed countries. Urbanization *per se* is often a positive development, as urban areas tend





## Some Studies by the Author



Urban Poverty Reduction Strategy for the Cities of Ludhiana and Ambala (2007-08)

Urban Poverty Profiles of Chandigarh and Ludhiana (2007-08)

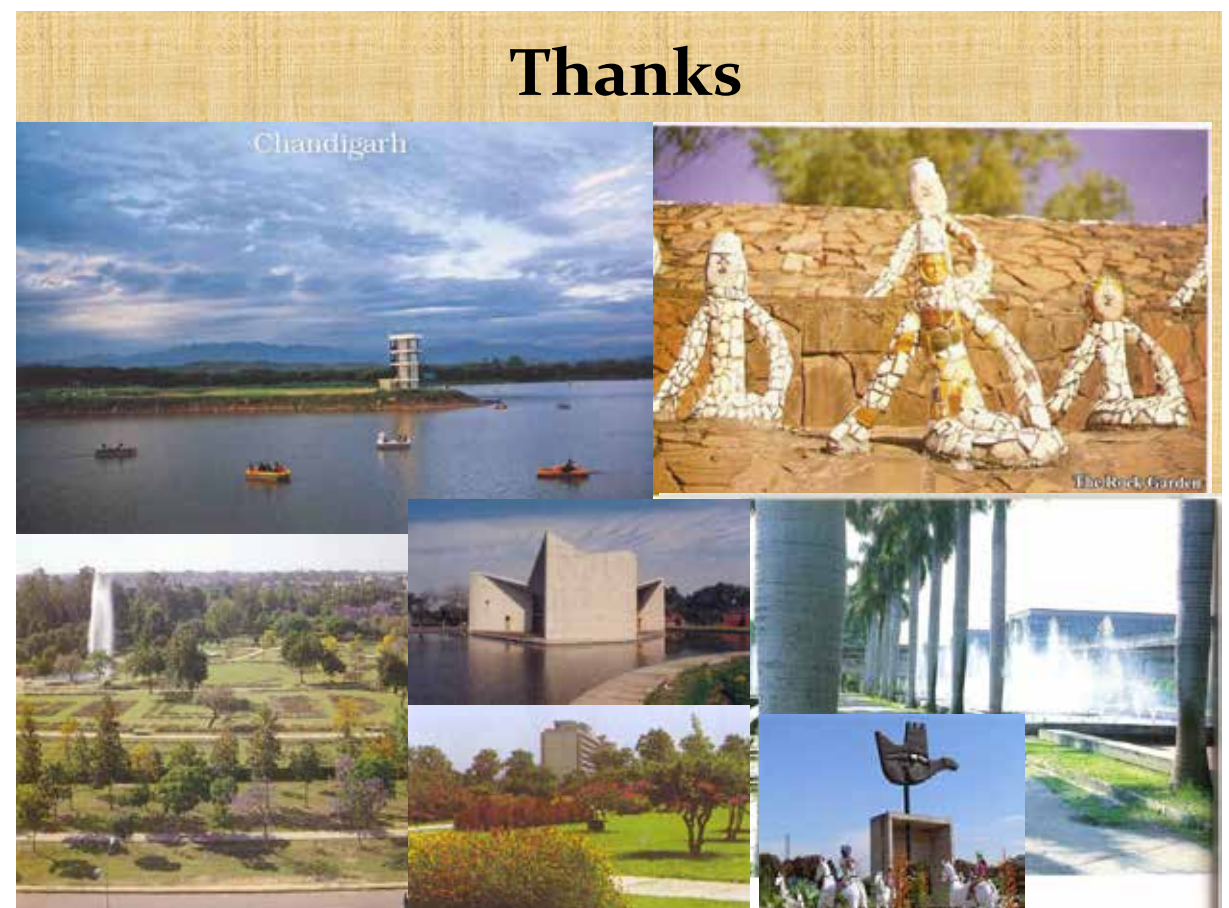
Concurrent Evaluation of NULM in Northwestern India (2017-18)

Third Party Evaluation of AMRUT (2015-17)

Housing for the Urban Poor in Chandigarh-PhD

Municipal Solid Waste Management in Punjab (2019-20)

Municipal Digitization and E Governance in Punjab under AMRUT (2020-21)



# Thanks

Administrative Development: A Journal of HIPA, Shimla. Volume II (1-2), 2013

## PROMOTING AND STRENGTHENING GOOD URBAN GOVERNANCE IN NORTH-WEST INDIA FOR SUSTAINABLE URBAN SETTLEMENTS: MAJOR ISSUES AND ALTERNATIVES (A CASE OF PUNJAB, HARYANA, H.P. AND CHANDIGARH)

Manoj Kumar<sup>\*</sup>, Sugandha Sharma<sup>†</sup> & Rajender Kumar<sup>‡</sup>

### Abstract

This paper is an effort to highlight major issues in urban governance in North-West India, which presently is at crossroads in Punjab, Haryana, Himachal Pradesh and Chandigarh, three states and a Union Territory selected for the study. Local Self Governments in north-western India have been unable to meet the concurrent challenges of rapid urbanization, development of environmental infrastructure/services, preservation of planned character of urban centres and most importantly management of transition of urban governance after enactment of 74<sup>th</sup> Constitutional Amendment Act of 1992. The system of participation is weakly developed and provides little articulation of interests of different population groups. Real empowerment of urban governance seems to be a distant dream as the process of functional and fiscal decentralization to local governments is tardy. The higher levels of governments are not willing to share powers, functions and responsibilities with the local self governments. The functions and responsibilities of parastatal/government departments is affecting involvement of local governments. Institutional, managerial and technical inefficiencies, outdated/time consuming urban management practices, lack of transparency, accountability, responsiveness and participation are affecting quality of urban governance and are major hurdle in sustainability of urban settlements. The paper argues that good urban governance is key to meet growing urban challenges and manage and develop urban settlements in sustainable manner. It needs to be strengthened by strongly pursuing the decentralization agenda as envisaged in the 74<sup>th</sup> Amendment to enable local governments to function

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<sup>†</sup> Guest Lecturer, GMSSS-35, Chandigarh

<sup>‡</sup> District Coordinator, BRGF Project, CRRID, Chandigarh

## SOCIOLOGICAL BULLETIN

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## Strengthening and Sustaining Vitality of Urban Areas: The Case of North-West India

Manoj Kumar Teotia

In the states of north-west India – Punjab, Haryana and Himachal Pradesh – and the Union Territory of Chandigarh, the urban areas are growing with serious deficiencies in infrastructure, housing, civic services, environment and governance. This article highlights the challenges that the urban areas of north-west India are facing and to see their short-term as well as long-term implications. An attempt has also been made to suggest alternative strategies and innovations to meet the urban challenges.

[Keywords: urbanisation; infrastructure; environment; governance; vitality; sustainability]

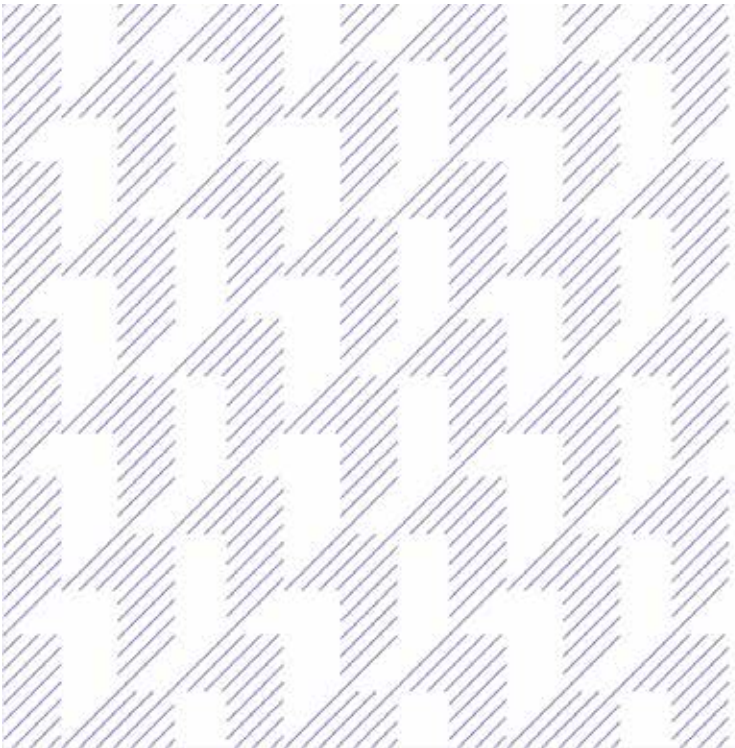
### Introduction

Globally the 'cities and towns are marvellous and vital instruments of exchange, vital for the development of economic systems and social organisations. Cities are also the very places where political activity occurs. Cities do, however, face tremendous challenges' (Freire 2001: xvii-xviii). Richard Stren (1996) has highlighted that, by their very nature, urban dilemmas are almost always multisectoral. India is no exception to this general urban scene. Despite the fact that urban areas are engines of economic growth and productivity, they are growing with serious deficiencies in infrastructure, services, environment and governance, the major constituents of the vitality of urban areas. The physical, economic, social, political and environmental conditions of the urban areas of the country have degenerated. Their improvement is a major challenge for



# BLUE ECONOMY

Ekaterina Vitaliyevna  
Kuzmina



## Efficient Use of Water Resources National Policy

**Ekaterina Kuzmina**  
  
**Vice President and Head of the  
Sustainable Development Department**  
  
**PJSC «Promsvyazbank»**



### Defining the Blue Economy

1

**World Bank:** «Sustainable use of ocean resources aimed at promoting economic growth, improving living conditions, and creating jobs, while preserving the health of the ocean ecosystem»

2

**European Commission:** «All economic activities related to oceans, seas, and coasts, encompassing a wide range of interconnected established and developing sectors»

3

**PSB and VEB Research & Expertise Institute:** «Sustainable integrated management of economic sectors that utilize marine and freshwater resources, aiming to drive economic growth, ensure environmental safety, and enhance the quality of life for the nation»

### Collaborative Research by PSB and VEB Research & Expertise Institute



Analytical book  
«Current Topics in the ESG Agenda»  
WATER RESOURCES:  
ISSUES AND SOLUTIONS



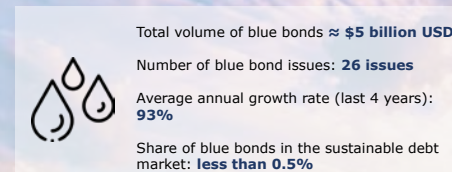


## The Potential of the Blue Economy in Russia

- The surface area of seas, rivers, lakes, and swamps in Russia **exceeds 12.7 million square meters, accounting for 74%** of the total area.
- The area of Russia's continental shelf constitutes **one-fifth of the world's continental shelf**.
- The length of Russia's coastline is nearly 60 thousand kilometers, ranking **3rd in the world**.
- Almost 90%** of Russia's population resides along its coastal areas, riverbanks, and lake shores.
- Water-dependent sectors of the economy demonstrate a notable sectoral synergy in job creation: for instance, **1 employee** in the fishing segment generates **7 jobs** within the entire fishery complex.
- Over **100 countries** already export water to meet their population's needs, with Russia ranking **2nd** in freshwater reserves and **3rd** in freshwater supply globally.
- According to the Federal Water Resources Agency, Russia possesses **20% of the world's drinking water supply**: that includes 8 thousand glaciers, 30 thousand reservoirs, and 5.5 million rivers and lakes. Consequently, Russia holds significant potential for exporting drinking water.



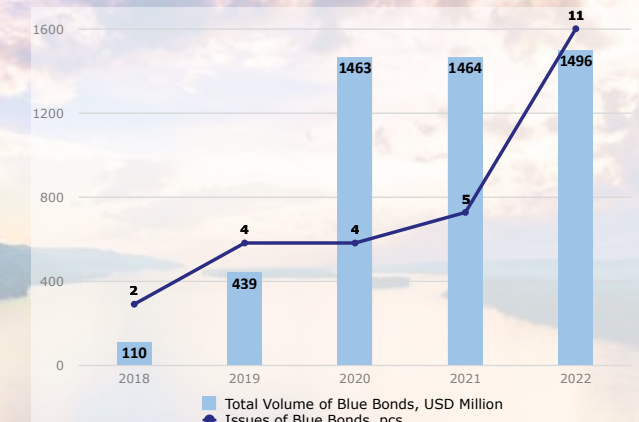
## Blue Bonds as an Effective Tool for Developing the Blue Economy



### Blue Bond Issues by Issuer Type (2018-2022):



### International Blue Bond Market from 2018 to 2022



Source: Bosmans, P.; de Mariz, F. The Blue Bond Market: A Catalyst for Ocean and Water Financing. J. Risk Financial Manag. 2023, 16, 184. <https://doi.org/10.3390/jrfm16030184>

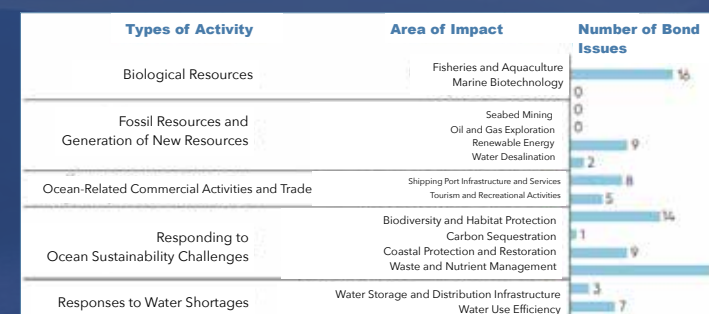
## Types of Blue Economy Projects



## Global Blue Bond Market



### Blue Bond Issues by Issuer Type, 2018-2022

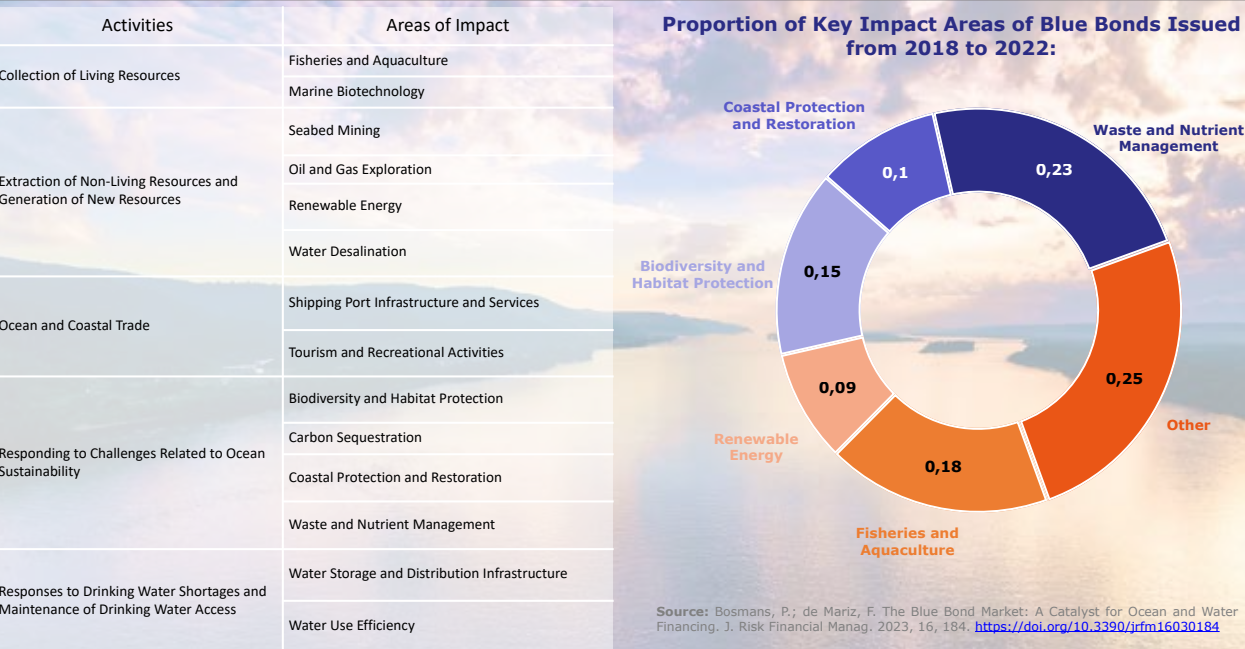


### Issues of Blue Bonds in 2018-2022. By Area of Activity

Source: Bosmans, P.; de Mariz, F. The Blue Bond Market: A Catalyst for Ocean and Water Financing.



Areas of Impact of Already Issued Blue Bonds



Russian case: Volga-Akhtuba Floodplain

**Year 2023**

**Issuer:** a Russian company  
**Amount:** up to 200 Billion Rubles  
**Maturity period:** 30 years  
**Coupon rate:** Russian ruble - 7.5%

**Use of proceeds:**  
Construction of:

- A 32 km-long supply canal;
- 2 gateway regulators;
- 4 overflow dams on eriks (shallow channels);
- Bank protection structures;
- Pumping stations;
- Hydroelectric power station with an installed capacity of 31.2 MW. The generated electricity is planned to offset the operating costs of the facility.

**Impact Indicators:**

- Ecological Impact
- Agricultural Impact
- Impact on Energy
- Impact on Transport
- Social Impact
- Impact on Neighboring Regions

First Sovereign Blue Bond Issue: The Seychelles

**October 2018**

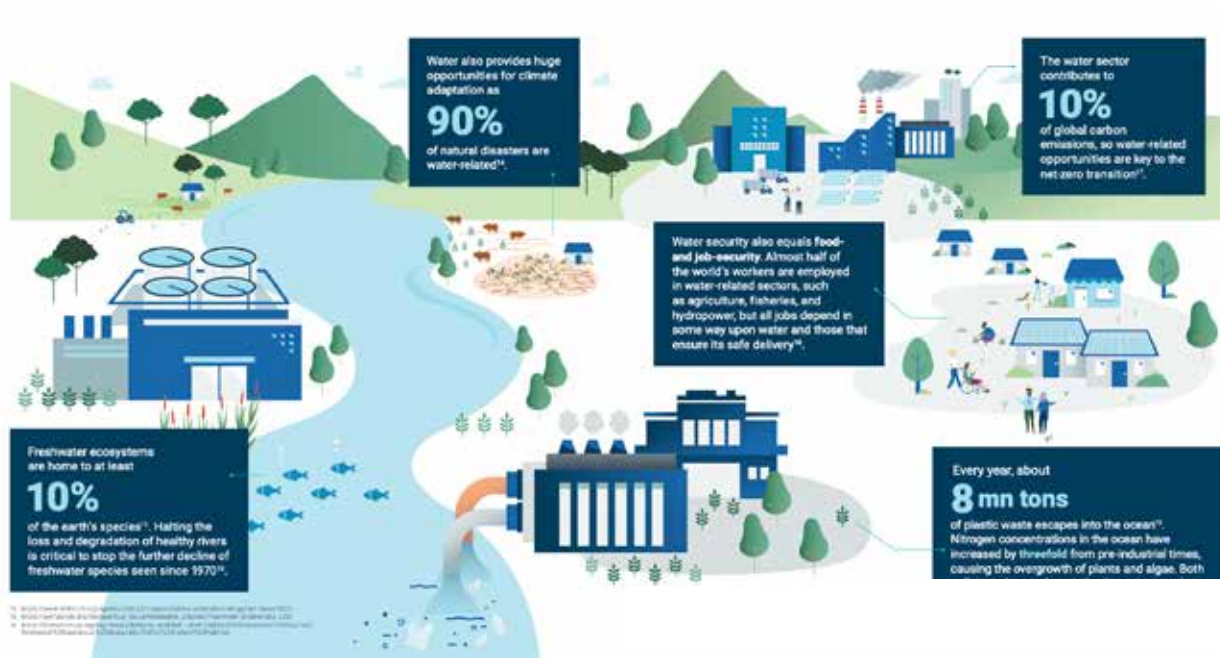
**Issuer:** Government of Seychelles  
**Amount:** USD 15 million  
**Maturity period:** 10 years  
**Coupon rate:** 6.5%

**Use of proceeds:**

- Expansion of marine protected areas for sustainable use;
- Improved management of priority fisheries;
- Project management and coordination, promotion of sustainable practices;
- Fisheries management planning;
- Educational programs;
- Restoration of reserves;
- Refurbishment of fishing vessels;
- Aquaculture development.

**Impact Indicator:**  
Increase the proportion of marine protected areas under sustainable use to 30% by 2020.

The Vital Role of the Blue Economy in the Ecosystem





#### Measures to Stimulate Financing of the Blue Economy:



##### **Creating investment opportunities by recognizing the ocean's crucial role in sustainable development.**

Support the development of guidance and examples related to ocean governance aligned with the Sustainable Development Goals (SDGs), aiding companies in identifying financing opportunities within the blue economy sector.



##### **Consolidating the concept of a «blue» bond within the standard framework for issuing «green» bonds by the Bank of Russia**

will significantly contribute to establishing a national system of environmentally sustainable securities in Russia.



##### **Development of rigorous reporting standards tailored to the characteristics of blue economy sectors in order to foster transparency and trust in the market.**

This includes establishing a «blue taxonomy» along with criteria, metrics, and benchmarks specific to these sectors.



##### **Cooperation with governments and multilateral development banks**

Government-issued securities, along with corporate issues, will influence market dynamics, creating favorable conditions for smaller players to participate. Public-private partnerships are especially relevant, given the smaller scale of many companies in the blue economy sectors.

# ALTERNATIVE APPROACHES TO RIVERS AND THEIR IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT IN INDIA AND RUSSIA

Thanks for your attention!

Ekaterina Kuzmina

Vice President and Head of the  
Sustainable Development Department

PJSC «Promsvyazbank»



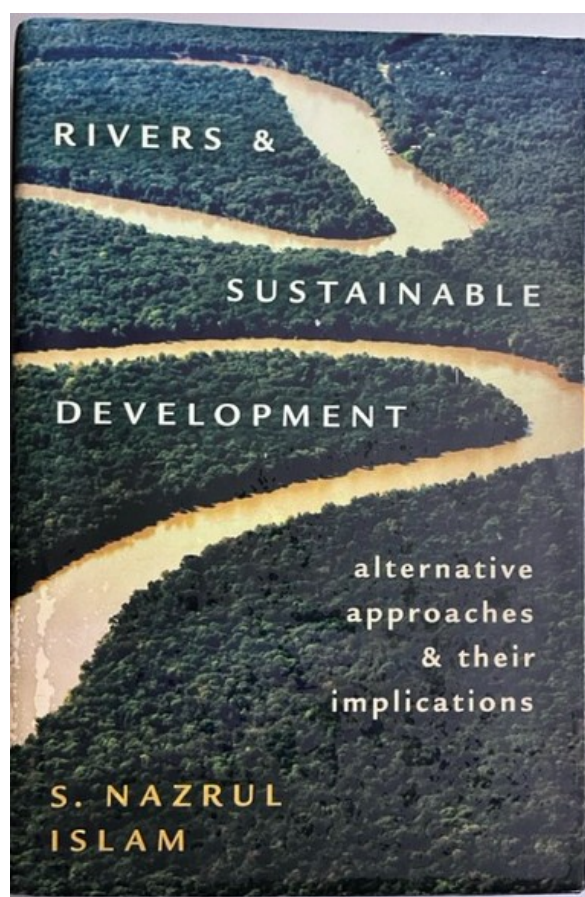
[psbank.ru](https://psbank.ru)

Dr. Nazrul Islam

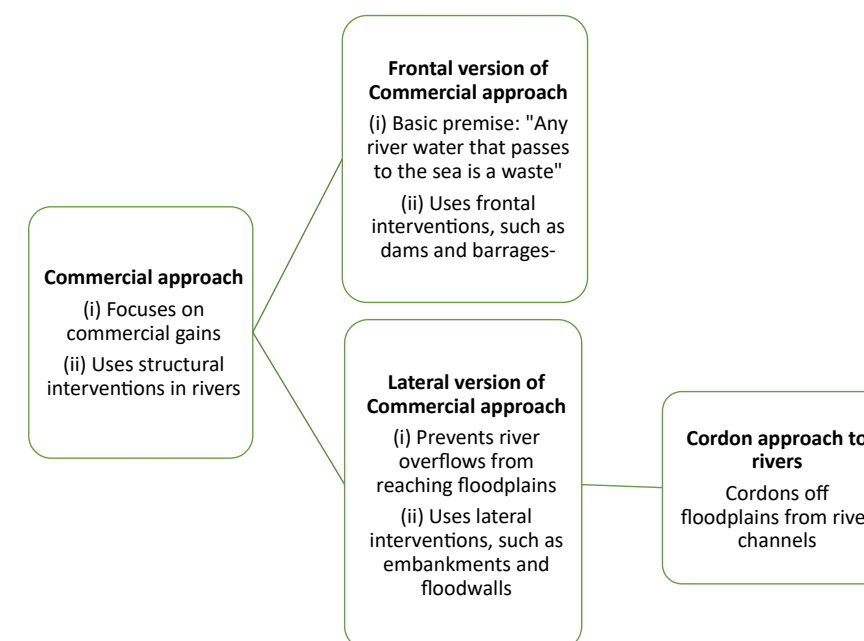
## Alternative approaches to rivers and their implications for sustainable development in India and Russia

Nazrul Islam

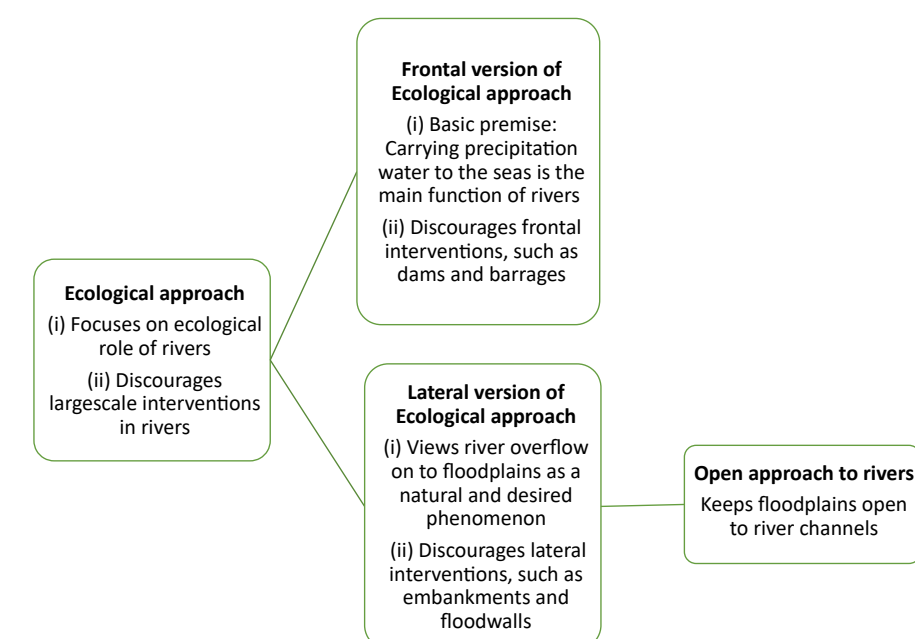
Visiting Professor, Asian Growth Research Institute (AGI), Japan  
Former Chief of Development Research, United Nations



## The Commercial Approach to Rivers

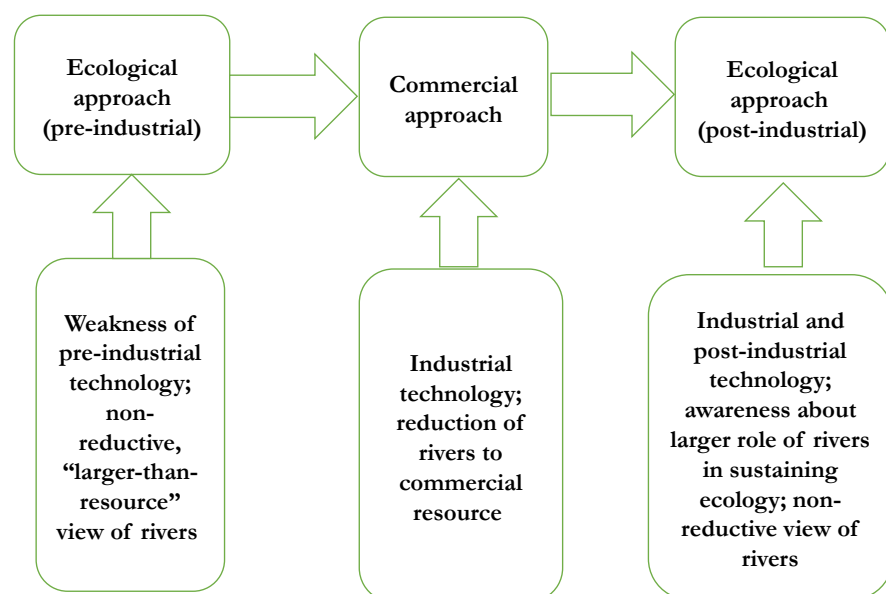


## The Ecological Approach to Rivers





## Evolution of approaches to rivers (Negation of negation)

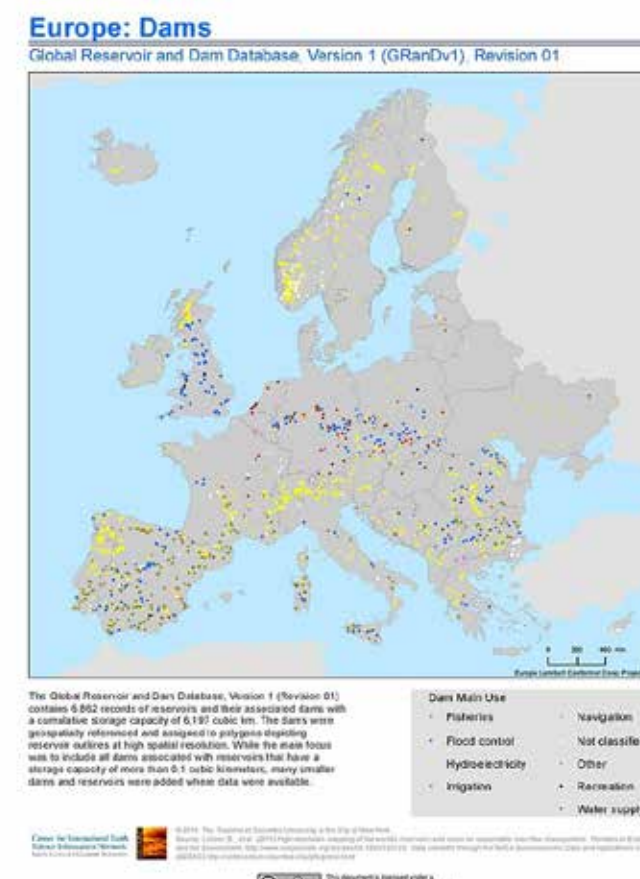


## Application of the Commercial Approach: Frontal Version

- Frontal intervention structures
  - Dams, barrages, weirs
- Spread of commercial approach in industrialized countries
  - Europe; USA and Canada; Australia; former USSR; Japan
- Spread of Commercial approach in developing world
  - China; India; other Asian countries
  - Africa
  - Latin America
- Global statistics on dams

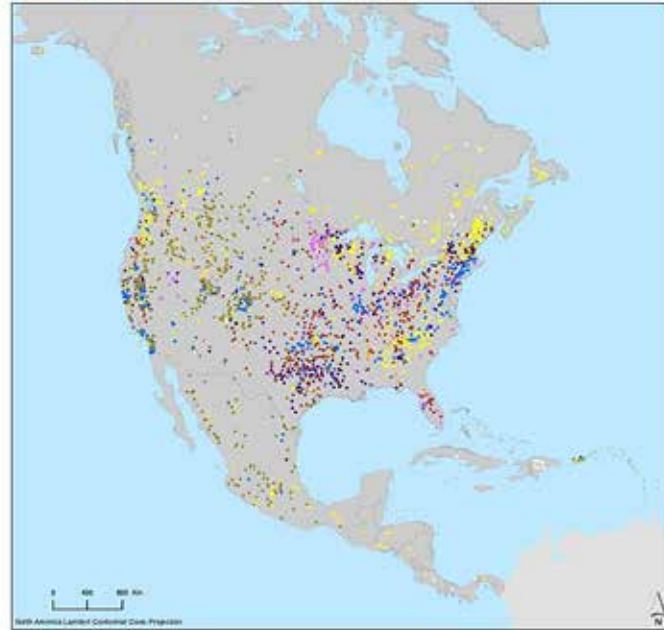
## Ecological Approach to Rivers

- Pre and post-industrial Ecological approach
- Ecological approach and sustainable development
  - Environmental protection
  - Sustainable agriculture
  - Sustainable urbanization and industrialization
  - Sustainable power generation
  - Cooperation among co-riparian nations/regions/communities
  - An active approach
- Ecological approach and Basin-wide strategy



## North America: Dams

Global Reservoir and Dam Database, Version 1 (GRanDv1), Revision 01



The Global Reservoir and Dam Database, Version 1 (Revision 01) contains 6,862 records of reservoirs and their associated dams with a cumulative storage capacity of 6,191 cubic km. The dams were geospatially referenced and assigned to polygons depicting reservoir outlines at high spatial resolution. While the main focus was to include all dams associated with reservoirs that have a storage capacity of more than 0.1 cubic kilometers, many smaller dams and reservoirs were added where data were available.

**Dam Main Use**

- Fisheries
- Flood control
- Hydropower
- Irrigation
- Navigation
- Not classified
- Other
- Recreation
- Water supply

Created by International Earth Science Information Network  
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Source: Gurney, B. et al. (2011) High-resolution mapping of the world's reservoirs and dams for sustainable development. *Reservoirs & Dams*, 10(1), 1-10. doi:10.1007/s10245-010-9101-1. Data courtesy through the IAGLR Reservoirs Data and Information Center (2004-2011) <http://www.iaglr.org/>

## Oceania: Dams

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## Asia: Dams

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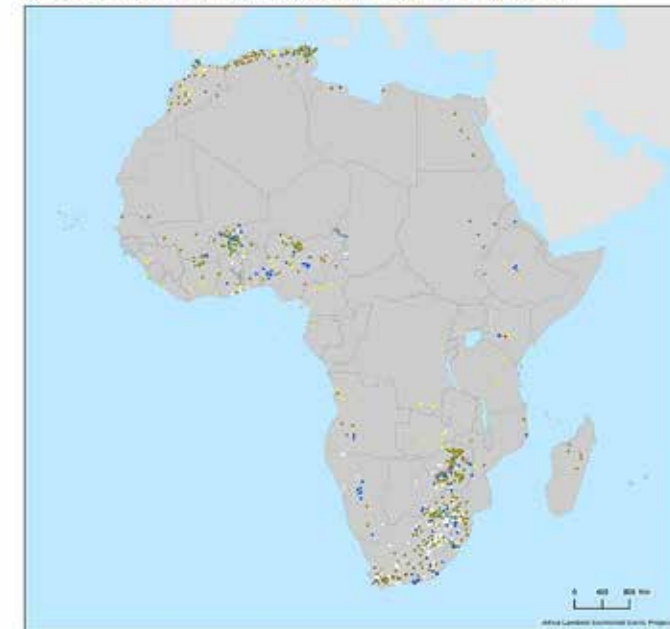
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## Africa: Dams

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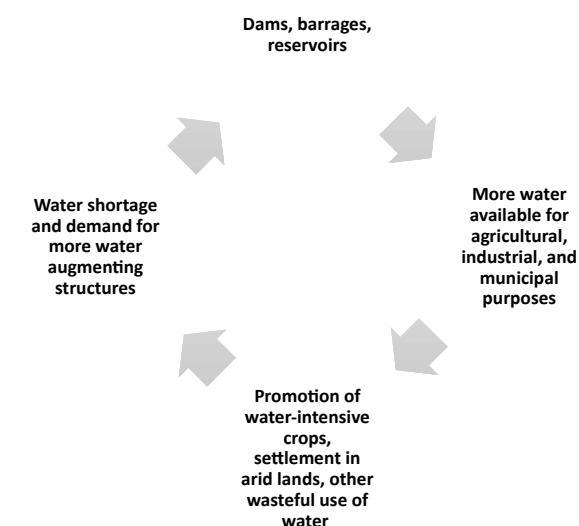




## Consequences of the Frontal Commercial Approach (1)

- **Beneficial effects of Commercial approach**
  - Electricity; irrigation; navigation; stabilization
- **Adverse effects on river morphology and hydrology**
  - Fragmentation of river
  - Upstream sedimentation, filling up of reservoirs, and widening of rivers
  - Downstream effects on river morphology
  - “More water, more thirst!” syndrome and exhaustion of rivers
  - Degradation of estuaries, deltas, and marine environment
  - Exhaustion/death of rivers

## “More water, more thirst!” syndrome



## Consequences of the Frontal Commercial Approach (2)

- **Adverse impact on the ecology of river basins**
  - Regular, expected flooding vs. unexpected and catastrophic flooding
  - Waterlogging and salinity
  - Toxification of return water
  - Effects on fisheries and aquatic life
  - Effects on the flora and fauna of river basins
- **Commercial approach and climate change**
  - Reservoirs as a source of GHG emissions
  - Non-renewability of hydro-power
  - Consequences of changes in precipitation pattern
  - Adverse consequences for deltas

### Consequences of the Frontal Commercial Approach (3)

- **Adverse social effects**

- Unfair distribution of costs and unfair treatment of indigenous and politically weak peoples
- Unfair distribution of benefits

- **Other risks**

- Exogenous and induced Seismic risks
- Security risks
- Dams and diseases
- Loss of lives during construction

### Consequences of the Frontal Commercial approach (4)

- **Costly benefits of Commercial approach**

- Cost-padding, cost-overruns, and delayed completion
- Costly hydro-power
- Costly irrigation
- Disappointing financial and economic rates of return

- **Commercial approach and conflicts**

- Conflicts among co-riparian countries/regions/areas
- Conflicts among different types of users

## Conclusions regarding the frontal version of the Commercial approach

- Frontal version embodied in dams, barrages, weirs
- Spread specially during the 19<sup>th</sup> and 20<sup>th</sup> centuries
- Over 50,000 large dams
- Benefits: irrigation; electricity; flow regulation; meeting municipal, industrial and other commercial needs
- Adverse consequences:
  - Benefits are not as great as claimed
  - Benefits could be achieved in other, most sustainable ways
  - Huge costs behind the benefits
  - Fragmentation, deformation, and exhaustion of rivers
  - Detrimental to river valleys, particularly which suffer from diversion
  - Conflicts among co-riparian entities

## Application of the Cordon Approach

- Instruments of Cordon Approach
  - *Embankments*
  - *Floodwalls*
  - *Channelization*
  - *Canalization*
- Cordon approach vs. Polder approach
- Different types of cordons



#### Cordon Approach to Separate Floodplains from River Channels

- Rivers as organic whole comprising both their channels and floodplains
- Floodplain nurturing functions of rivers
  - *Maintaining floodplain elevation*
  - *Fertilization*
  - *Irrigation*
  - *Recharging of surface water bodies and underground aquifers*
  - *Fisheries*
  - *Preservation of the flora and fauna*
  - *Waterways*
  - *Moderation of temperature*
  - *Cleansing*
  - *Aesthetic function*
  - *Socially fair distribution*

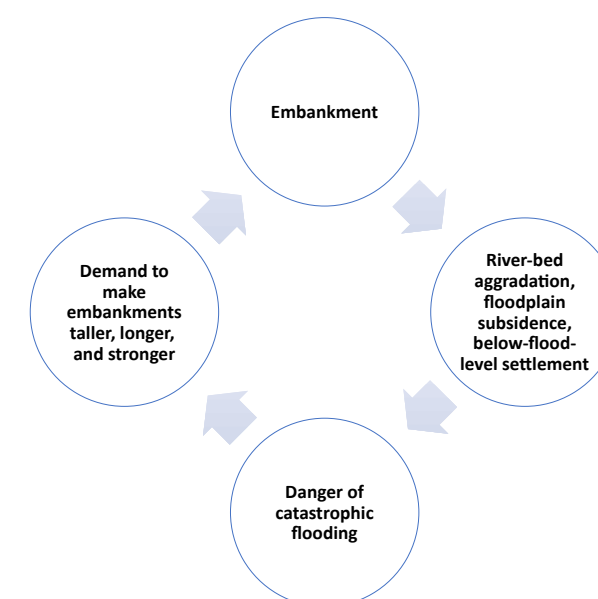
#### Effects of Cordon approach on floodplains

- *Below-flood-level settlement*
- *Danger of catastrophic flooding*
- *Transfer flooding outside cordons*
- *Conflicts among co-riparian communities*
- *Substitution of gravity-based drainage and irrigation by pump-based drainage and irrigation*
- *Waterlogging inside cordons*
- *Toxification of soil and water*
- *Subsidence of floodplains*
- *Vicious cycle of “Lower to higher embankment!”*
- *Adverse effects on surface waterbodies*
- *Adverse effects on open fisheries*
- *Adverse effects on waterways*
- *Adverse effects on underground waterbodies*
- *Adverse effects on flora and fauna*
- *Adverse effects on cleansing, hygiene, and aesthetics*

#### Effects of Cordon approach on river channels

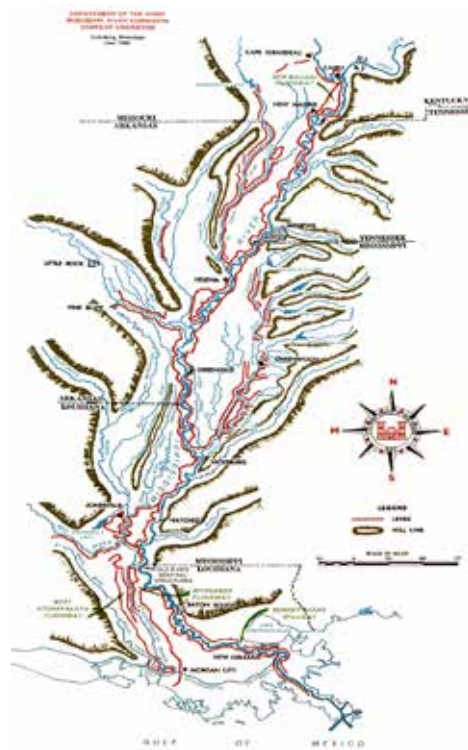
- *Effects of embankments (double sided)*
  - Upstream: sedimentation; funnel effect;
  - Downstream: sedimentation; widening
  - Within the embanked stretch: river-bed aggradation
- *One-sided embankments:*
  - *Transfer flooding*
- *Effects of channelization*
  - *Shortening of rivers*
  - *Loss of wetlands*
  - *Rapid progression of flood*
- *Effects of canalization*
  - *Loss of the natural characteristics of a river*

#### “From lower to higher embankment!” vicious cycle



## Cordon approach in the USA

- 100,000 miles of levees; 40,000 miles of river levees. 43 percent of population in counties with at least one levee
- Mississippi; San Joaquin Rivers in California and Kissimmee River in Florida
- Channelization: Mississippi shortened by 300 km
- 87 million hectares of wetlands (mostly freshwater marshes) lost;
- Long-lasting nature of damages caused by canalization
- \$123 billion spent on flood control since the 1920s; yet annual flood damage triple to \$6 billion; inflation-adjusted costs of flood damages doubled since the passing of Flood Control Act in 1937
- Canalization: Los Angeles River



## Case study of Cordon approach: *Mississippi Levee System*

- Mississippi River physical characteristics
  - Missouri-Mississippi – longest river; 3,730 km; 3.22 min sq. km catchment basin; 40 pct of continental landmass; 31 states and 2 Canadian provinces; water takes 90 days to travel
  - Three parts:
    - Upper (up to St. Louis, where Missouri meets Mississippi) (43 dams and barrages)
    - Middle (St. Louis to Cairo, where Ohio River meets; 310 km) (free flowing)
    - Lower Cairo to Gulf
  - Annual average flow fluctuates between 7,000 to 20,000 cumec; 5<sup>th</sup> largest in terms of discharge; Amazon being the highest with about 200,000 cumec)
- Evolution of Mississippi Levee System
  - Began from New Orleans, in 18<sup>th</sup> century; initial 80 km to protect New Orleans
  - 1882-mid 1980s by US Army Corps of Engineers, 5,600 km; average height 7.3 m (in places 15 m); 610 km unbroken stretch, southward from Pine Bluff, AK;
  - Channelization, leading to shortening by 300 km

## Case Study: *Mississippi Levee System (2)*

- Consequences of Mississippi Levee System
  - Below-flood-level settlements
  - Transfer flooding
  - Replacement of natural irrigation and drainage by pumps
  - Promotion of chemicalized mono-crop agriculture
  - River bed aggradation
  - Reduction of sediment volume
  - Degradation of Mississippi Delta
  - Catastrophic floods of 1993, 2008, 2011, 2016, 2019
  - Hurricane Katrina: loss of \$26 billion (2018 dollars)
- Special problems of lower Mississippi
  - Possibility of adopting the Atchafalaya River as the new route to the sea



## Cordon approach in Europe

- Embankments along Po, Rhine, Meuse River, Rhone, Loire, Vistula, Rhine, Maas/Meuse, Scheldt, and the Danube River
- 90 pct of former floodplains lost; intensification of flood in the remaining 10 pct
- Channelization: Rhine river shortened by 80 km; time needed by floodwater to travel from Basel to Karlsruhe (Germany) halved
- Width from 12 km (at places) to 250 m (at places)
- Flood losses in Switzerland increased four-fold over the past 35 years, despite large increases in flood control investments
- Po River in Italy: “From embankment to higher embankment! syndrome

## Spread of the Ecological approach in Developed countries (1)

## USA

- Cancellation of Eco Park Dam and two other dams in Glen Canyon
- Environmental Protection Act (1969),
- Clean Air Act (1970)
- Clean Water Act was enacted in 1972, amended in 1977
  - Ohio's Cuyahoga River fire in 1969
- Removal of about 500 dams
- Resuscitation of Colorado Delta
- Restoration of San Joaquin River (California); Snake River (north-west), Kissimmee River (Florida)

## Dams removed in the USA



## Ecological approach in developed countries (2)

- Europe
  - Follow up on Stockholm Declaration
  - EU Directive on water policy, 2000
    - River Basin Management Plan (RBMP)
  - Removal of dams and restoration of rivers
- Australia
  - Murray-Darling Basin Plan
  - Reduction of withdrawal by 2.75 ckm, when 7.60 ckm is needed
- Japan
  - Nagara River estuary dam sparks anti-dam movement in 1980s
  - Nagano Prefecture Declaration – cancellation of Asakawa dam
  - Yoshino River estuary dam referendum in 2000
  - Cancellation of plans for dams on Yodogawa River
  - Dismantling of Arase Dam (Kumagawa River) and several other dams

## Dams removed in Europe



### Open Approach: Lateral version of Ecological approach

- **Open approach and sustainable development**
  - *Open Approach and sustainable agriculture*
  - *Open approach and sustainable urbanization and industrialization*
  - *Open approach and climate change*
  - *Open approach as an active strategy*
- **Flood proofing measures**
  - *“Dig-elevate-dwell” principle of settlement*
  - *Minimization of obstruction to waterflows on floodplains*
  - *Re-excavation and dredging*
  - *Land levelling and terracing*
  - *Re-direction of cropping research*
  - *Enhancing groundwater recharge rate*
  - *Better use of weather forecasts and other scientific information*
- **Flood regulation measures: embankments under Open approach**
- **“Soft/non-structural” and “hard/structural” measures**

## Open approach in USA

- Following 1993 flood (\$18 billion damage) Interagency Floodplain Management Review Committee (IFMRC) called for a “new approach”
  - Levees are not the solution
  - Floodplains and wetlands need to be allowed to perform their “natural functions.”
  - Restrain development on floodplains.
- A string of activities New approach to Mississippi levees following 1993 flood
  - *Reclaiming wetlands and floodplains to serve as natural sponges*
  - *Return part of floodplains to rivers*
  - *Relocating people from floodplains (four whole communities, with two in Illinois (Valmeyer and Grafton) and two in Missouri (Rhineland and Pattonsburg) were relocated.)*
  - *Restriction on further building on floodplains*
  - *Restraint on channelization, etc.*
  - *Modifications of the Mississippi levee system: efforts toward loosening the levee framework in order to avoid catastrophic flooding in future*

## Great Mississippi Flood of 1993

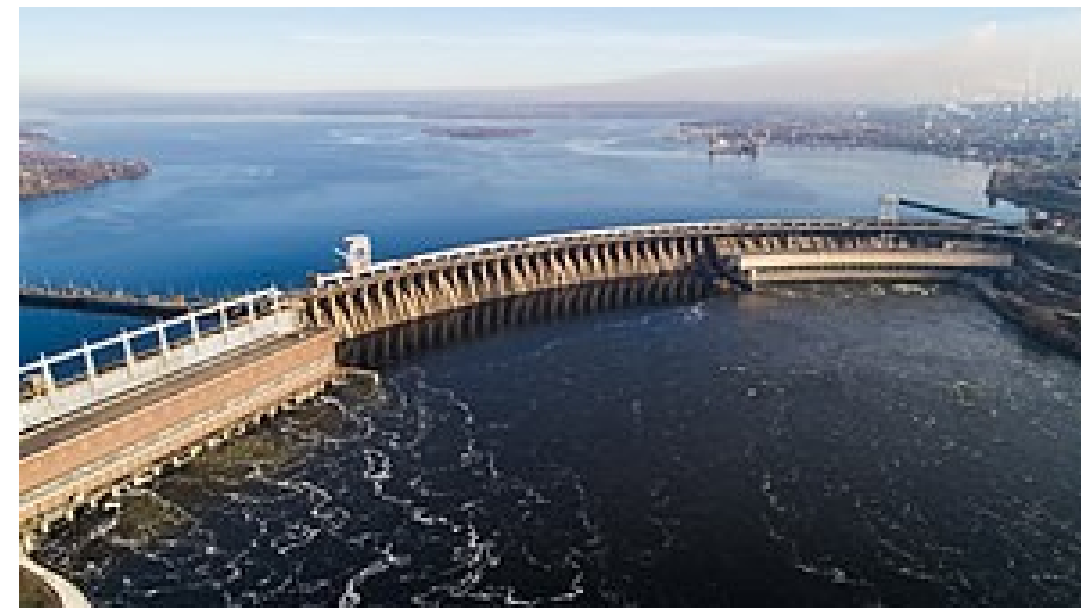




## River restoration activities in Europe

- 1995: European Centre for River Restoration (ECRR)
- RESTORE (Rivers: Engaging, Supporting and Transferring knOwledge for Restoration in Europe) project offers information on almost 1,000 river restoration case studies
- FLOBAR2 (Floodplain Biodiversity and Restoration) project – more attention to *floodplain* restoration, “as an essential part of sustainable water management.” Restoration activities focused on floodplain reconnections
- NWRM (National Water and River Management) catalogues about 125 case studies illustrating hydromorphology measures aimed at river wetland and floodplain restoration and management, restoration and reconnection of seasonal streams or oxbow lakes, elimination of riverbank protection, re-naturalization of polder areas, etc.
- Case study: River Mur; tributary of Drava River, which is a tributary of the Danube River: 2nd prize at 2014 European River Restoration Conference

## Dnieper Hydroelectric Station



## Application and consequences of Commercial approach in the former USSR

- Former USSR followed the Commercial approach very enthusiastically.
- Dnieper Hydroelectric Station was one of the major projects of the Soviet Union's 1<sup>st</sup> FYP (1927-1932. Elevates river by 37 meter (121 ft), maintains water level of the Dnieper Reservoir (3.3 km<sup>3</sup>) and stretches 129 km upstream of Dnipro city.
- Rebuilt after WWII and expanded during (1969-1980) to quadruple the output
- Many other such large dams were built during the Soviet period.

## Dams with largest reservoir capacity

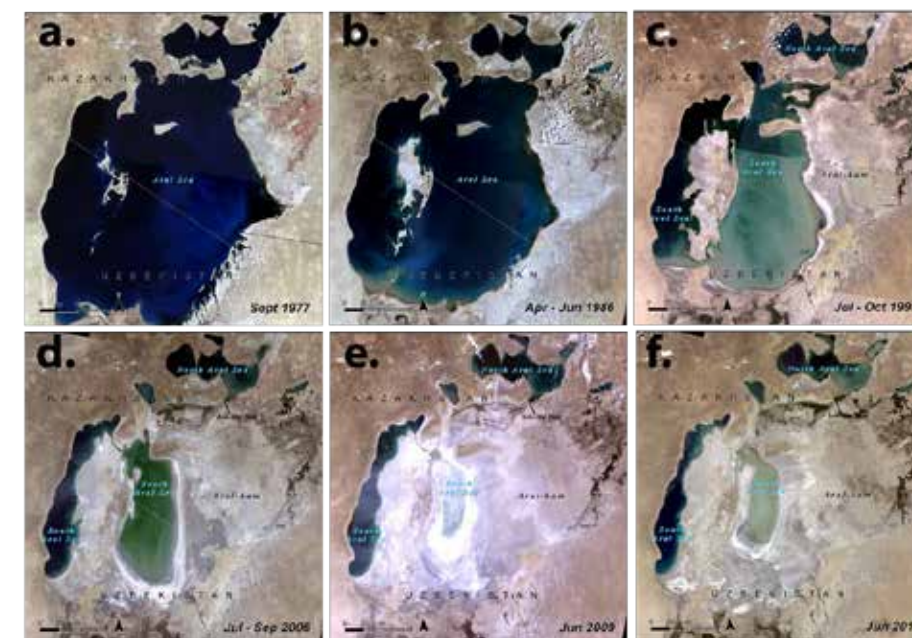
Source: ICOLD

	Dam	Country	Year completed	Reservoir volume (10 <sup>6</sup> m <sup>3</sup> )
1	Kariba	Zambia	1959	180,600
2	Kariba	Zimbabwe/Zambia	1959	180,600
3	Bratsk	Russia	1964	169,000
4	Aswan High	Egypt	1970	169,000
5	Akosombo	Ghana	1965	150,000
6	Daniel Johnson	Canada	1968	141,851
7	Guri	Venezuela	1986	135,000
8	W.A.C. Bennett	Canada	1967	74,300
9	Hidase (C)	Ethiopia		74,000
10	Krasnoyarsk	Russia	1967	73,300
11	Zeya	Russia	1978	68,400
12	Robert-Bourassa	Canada	1978	61,715
13	La Grande 3	Canada	1981	60,020
14	Ust-Ilimsk	Russia	1977	59,300
15	Boguchany	Russia	1989	58,200
16	Kuibyishev	Russia	1955	58,000
17	Serra da Mesa (Sao Felix)	Brazil	1993	54,400
18	Caniapiscou	Canada	1981	53,790
19	Cahora Bassa	Mozambique	1974	52,000
20	Bukhtarma	Kazakhstan	1960	49,800

## Experience of the Aral Sea

- Diversion Amu Darya and Syr Darya flows for cultivation of cotton, etc.
- Qaraqum Canal, Karshi Canal, Bukhara Canal
- Initial good results: Uzbekistan became the largest exporter of cotton in 1988
- Huge loss of water due to seepage and evaporation; increase in soil salinity
- However, it led to drastic reduction of the flow into the Aral Sea and led to its gradual desiccation
- By 2004, Aral Sea reduced to one-fourth of its original size
- Extreme high salinity in what remains of the Aral Sea; graveyard of bygone ships
- Horrendous rates of child and maternal mortality
- “One of the planet’s worst environmental disasters”
- There were even plans to reverse the direction of the great Siberian rivers, such as Ob, Yenisei, and Lena Rivers from north to south

## Desiccation of the Aral Sea



## Commercial approach applied to Amu Darya and Syr Darya



## Application of Commercial approach in India

- India followed the Commercial approach with considerable gusto.
- Inaugurating Bhakra Nangal Dam on the Satluj River, Nehru called the dams as “temples, mosques, and cathedrals of our times.”
- India is the largest dam builder after China and the United States
- The benefits of the dams are subject to questions
- Rohini Pande study suggests and dams contributed to only about 6 percent of the increase in food output
- Nevertheless India continues with Commercial approach and has now adopted the mammoth River Linking Project, costing about 110 billion dollars.



## Countries having highest number of large and major dams

Source: ICOLD

Rank	Large dams	
1	China	23,841
2	USA	9,265
3	India	5,100
4	Japan	3,119
5	Brazil	1,364
6	South Korea	1,338
7	Canada	1,169
8	South Africa	1,112
9	Spain	1,063
10	Albania	974
11	Turkey	709
12	France	593
13	United Kingdom	570
14	Mexico	567
15	Australia	541
16	Italy	520
17	Iran	371
18	Germany	335
19	Norway	254
20	Zimbabwe	244

## Findings of Esther Duflo and Rohini Pande (2007) study

- Irrigation has been the primary purpose of 96 percent of Indian dams
- All the increase in output is generally attributed to the dams
- However, there has been huge increase in other inputs, such as fertilizer, high yielding seeds, machinery, extension services, etc.
- Also alternative irrigation methods would have operated in absence of dams
- Need to separate out the impact of these “confounding factors” in determining the contribution of dams
- Econometric innovation: Use of “slope” as the instrumental variable for the number of dams
- **Only about 9 percent of the incremental output could be attributed to Dams**

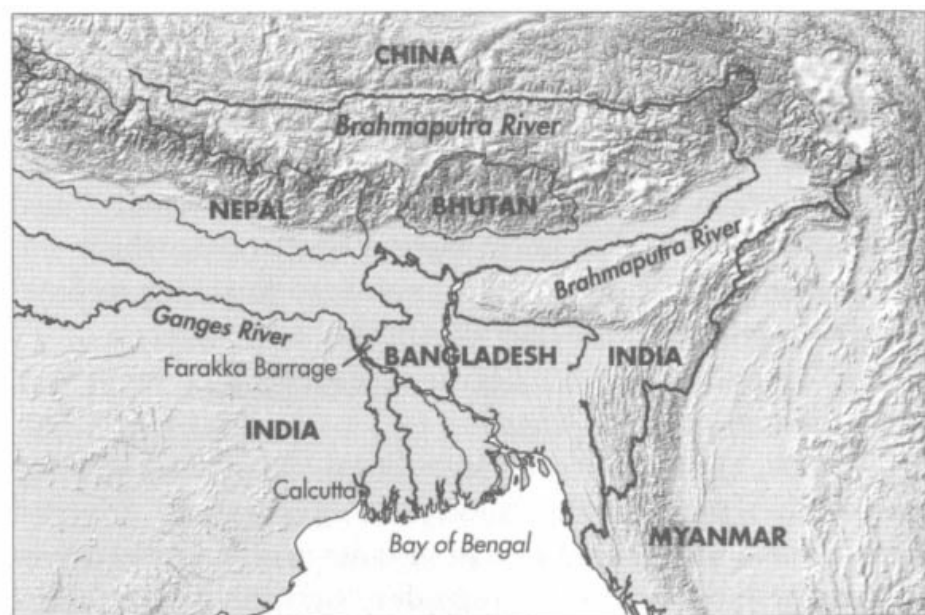
## Commercial approach of India and river-related conflicts with neighboring countries

- Commercial approach has led India into conflicts with its neighboring countries
- Particularly severe are the conflicts with Bangladesh
- Diversion of water from shared rivers by barrages, such as Farakka and Gajoldoba has had devastating effects on Bangladesh
- This is hindering broader cooperation among the two countries
- India has river-related conflicts with Nepal, Bhutan, and Pakistan too
- The Commercial approach is now leading conflict between India and China over sharing of the Brahmaputra River

## India’s commercial approach has led to river-related conflicts with it neighboring countries

- Diversion of the Ganges water using the Farakka Barage
- Diversion of the Teesta water River the Gajoldoba Barrage
- India’s plan to impound and divert Meghna water using Tipaimukh Dam and Fulertal Barrage
- India’s River Linking Project to divert the Brahmaputra water and more water from the Ganges River
- Conflict with Nepal regarding border dams and barrages
- Conflict with Bhutan regarding various dams and barrages
- Conflict with Pakistan regarding the Baglihar hydro project on the Chenab River
- India’s conflict with China regarding Upper Brahmaputra River

## Map of Farakka Barrage diverting Ganges water away from Bangladesh

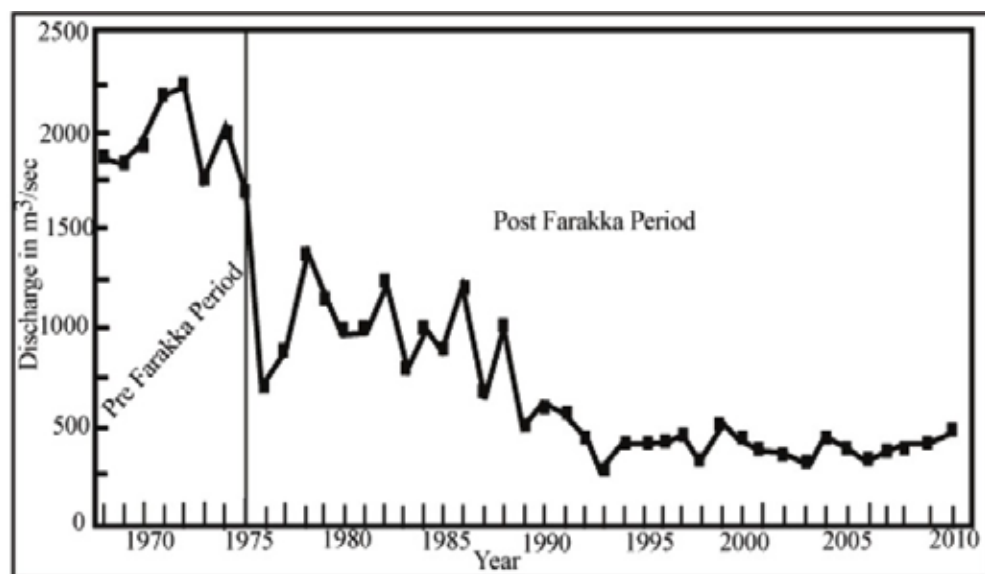


Postel, 1999

## Dried up Ganges River in Bangladesh (at Hardinge Bridge) due to Farakka Barrage



## Decline in the flow of the Ganges River in Bangladesh due to the Farakka Barrage

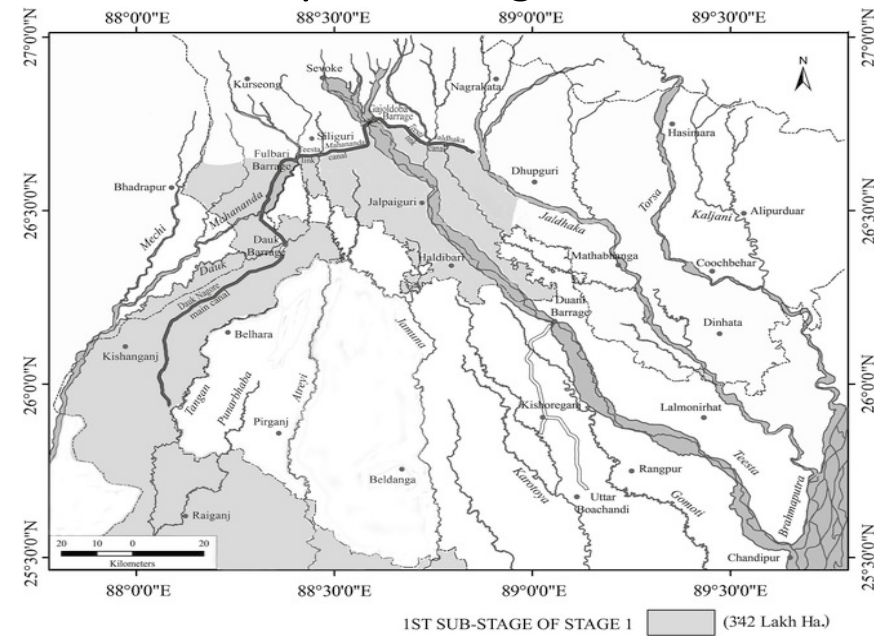


## Dried up Garai River, a distributary of the Ganges in Bangladesh



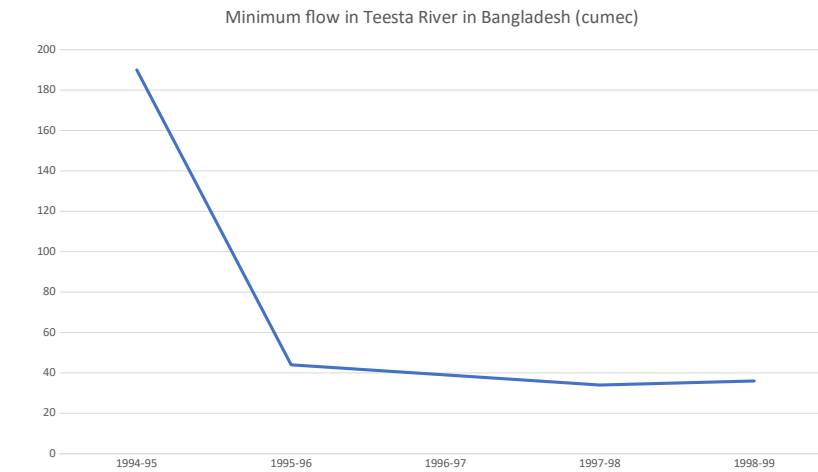


## Map of the Gajoldoba Barrage diverting Teesta water away from Bangladesh



## Decline in the flow of Teesta River in Bangladesh due to India's Gajoldoba Barrage

Source: Mukherjee and Saha (2013)



## Diversion of Teesta water by India



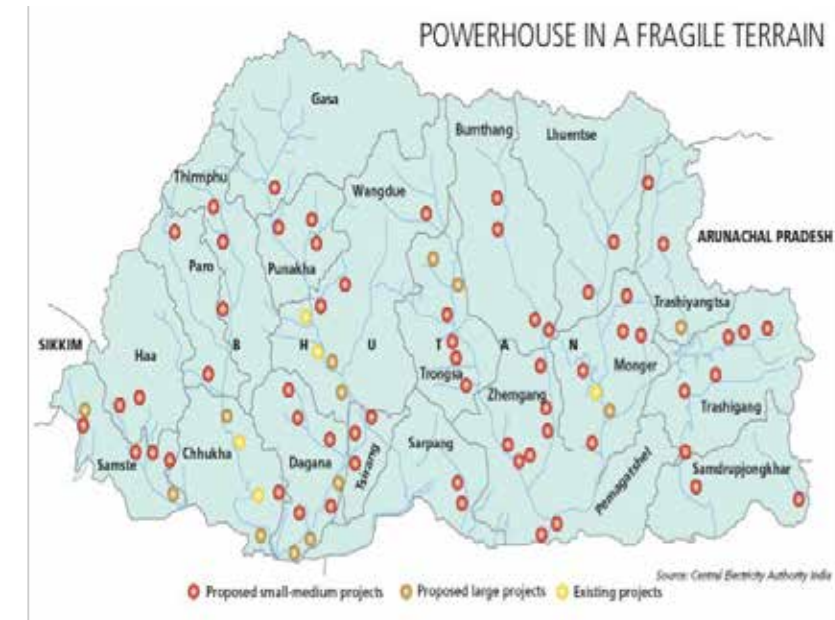
## Dried up Teesta River in Bangladesh due to Gajoldoba Barrage



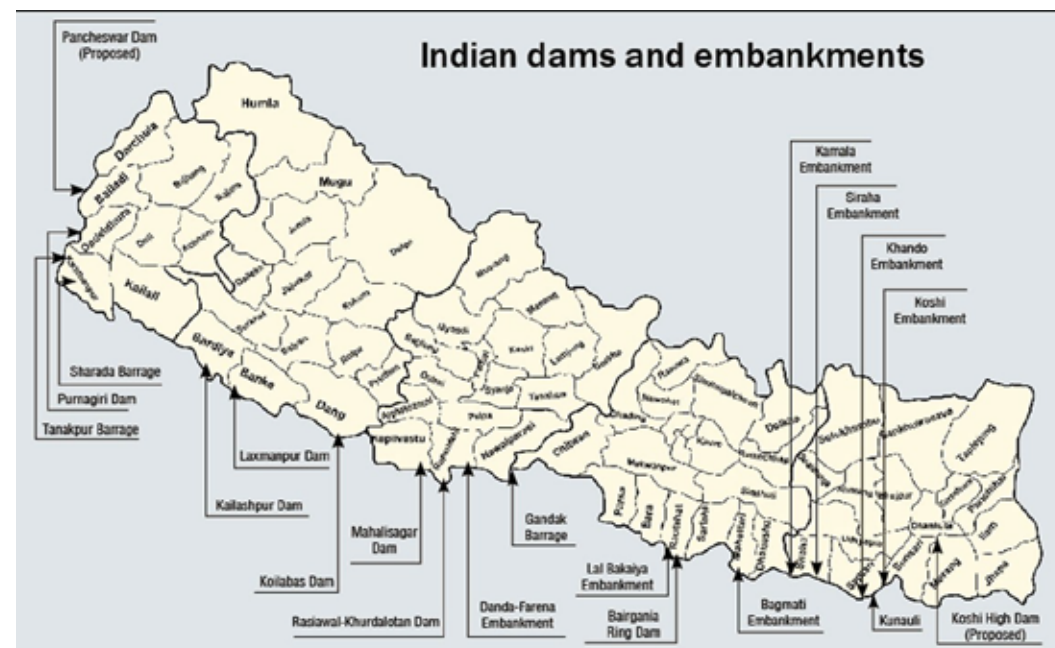
## Indian River Linking Project



## India-Bhutan conflicts regarding rivers



## India-Nepal conflicts regarding rivers



## India-Pakistan conflicts regarding rivers

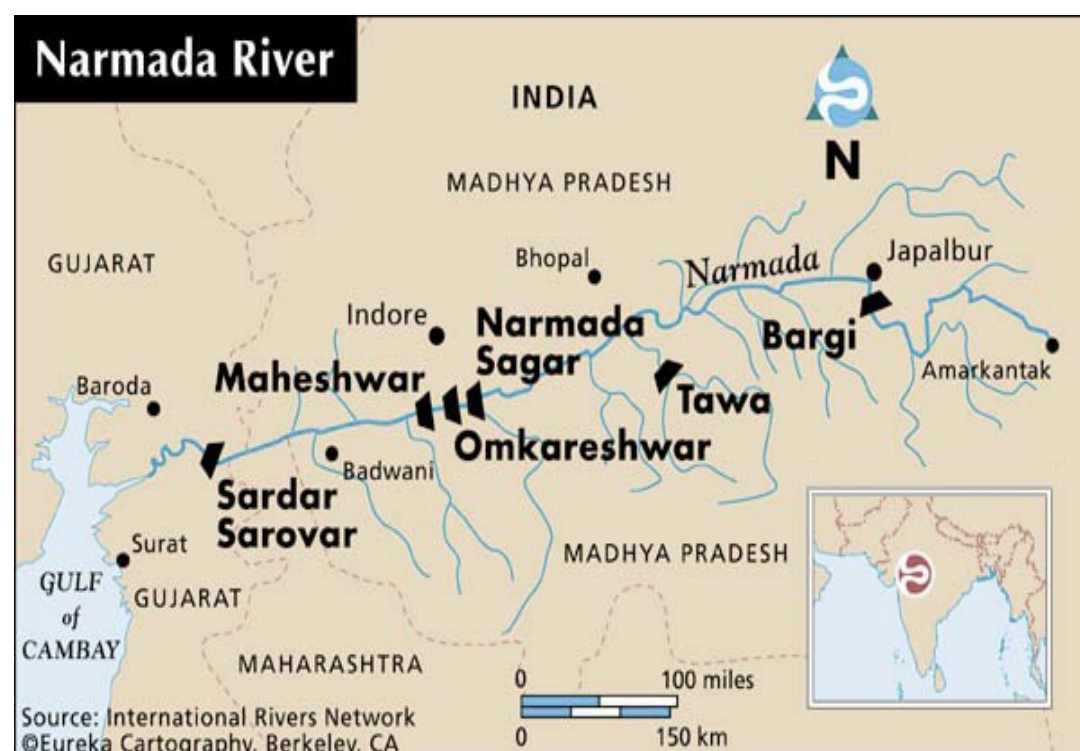




## Spread of the Ecological approach in India

- Narmada Bachao Andolon (NBA)
- International Commission on dams – Dams and Development
- Criticisms of River Linking Project
- Demand for demolition of the Farakka Barrage
- West Bengal's Chief Engineer, Kapil Bhattacharya predicted that Farakka will not solve the problem of siltation of the Kolkata port. He was sacked. History has proven him to be true. Farakka has not desilted Kolkata port and instead created flooding and river erosion problem in Bihar. Nitish Kumar, the former Chief Minister, is leading a movement to demolish Farakka Barrage. He is supported by such people as Rajendra Singh, "Waterman of India," who has called Farakka as a "curse" (*abhishap*) and said that "we cannot move forward unless this curse is removed."

## Women protest against Sardar Sarovar Dam on Narmada River



## Spread of the Ecological approach in Russia

- Valdai conference
- Recent flooding in Orenburg and Orsk (April, 2024)
- Extreme seasonal floods hit northern parts of Kazakhstan and Russia's Orenburg region across the border
- A major flood in the southern Urals forced thousands of Russians to evacuate their homes
- The Ural River, which runs from the Ural Mountains to the Caspian Sea, burst through a dam Friday in Orsk, a city of about 200,000 people. Another part of the dam burst a day later, further flooding villages in the area. The Orsk oil refinery suspended work Sunday to mitigate ecological risks.
- Orenburg officials have estimated the flood damage at about \$226 million so far.
- Residents of Orsk, one of the disaster's epicenters, took to the streets to criticize the authorities' response and demand help from President Vladimir Putin.
- Russia's main investigative body, the Investigative Committee, opened a criminal case as a result of "violation of safety measures" and "negligence," citing the dam's poor maintenance as a cause of the breach

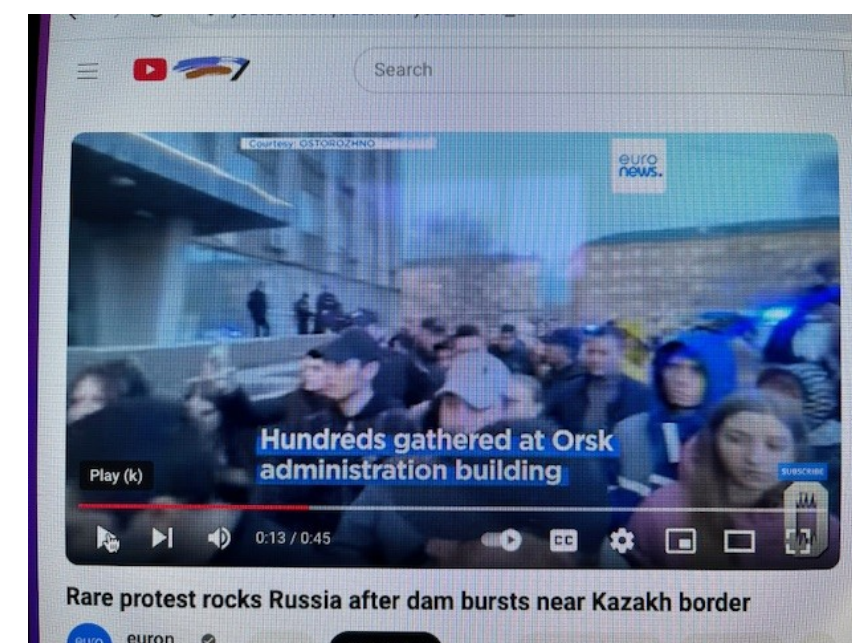


## Spread of the Ecological approach in Russia

- The dam was designed to withstand water levels no higher than 18 feet, but by Saturday, the river had risen to 31 feet, according to regional authorities. Since the dam was built about a decade ago, it has been subject to several investigations regarding embezzlement and construction mistakes.
- In 2014, the Federal Financial Monitoring Service launched an inquiry into the misappropriation of about \$1.3 million of state funds by subcontractors building the dam, the Izvestia newspaper reported.
- An independent expert involved in the 2014 proceedings, Oleg Dyukarev, told Izvestia the analysis conducted upon the dam's completion revealed serious issues with the structural integrity and quality of construction.
- "During the examination, I identified violations in the amount of actual construction work that was performed," Dyukarev said. "To put it simply, on paper the work was completed, but in fact it wasn't."
- In 2020, Rostekhnadzor, the country's supervisory body in charge of key ecologic and nuclear sites, found 38 maintenance violations, for which it charged the municipality a fine of about \$200, Russian news outlet MSK1.ru reported.



Flood affected people of Orsk express concern about flooding





## Conclusions

- There are two alternative approaches to rivers
  - Commercial
  - Ecological
- Frontal variant of the Commercial approach
  - Dams, Barrages, Weirs, etc.
- Lateral variant of the Commercial approach -- Cordon approach
  - Embankments, channelization, Canalization
- Both Russia and India have followed the Commercial approach
- For sustainable development, both need to switch to the Ecological approach and its lateral version, the Open approach
- By doing so, they can set examples for other developing countries to follow and proceed towards sustainable development

# CREATION OF AN INLAND WATER SYSTEM: RUSSIAN AND INDIAN EXPERIENCE

Alexei Vladimirovich  
Kupriyanov



НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ИНСТИТУТ  
МИРОВОЙ ЭКОНОМИКИ И МЕЖНАРОДНЫХ ОТНОШЕНИЙ  
ИМЕНИ Е.М. ПРИМАНОВА  
РОССИЙСКОЙ АКАДЕМИИ НАУК

# Creation of an inland water system: Russian and Indian experience

Dr Alexey Kupriyanov,  
IMEMO RAS

## Cargo turnover in Russia (t·km)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All types of transport, incl.:	5056	5084	5080	5108	5198	5488	5635	5678	5401	5701
By railways	2222	2196	2301	2306	2344	2493	2598	2602	2545	2639
By roads	249	250	247	247	248	255	259	275	272	285
By pipelines, incl.:	2453	2513	2423	2444	2489	2615	2668	2686	2470	2653
Gas	1265	1289	1203	1176	1181	1300	1336	1318	1221	1371
Crude oil	1152	1182	1178	1226	1262	1265	1276	1318	1197	1230
Oil products	36	42	42	42	46	50	55	51	52	51
By sea	45	40	32	42	43	50	37	41	43	44
By inland waterways	81	80	72	64	67	67	66	66	64	71
By air	5,1	5,0	5,2	5,6	6,6	7,9	7,8	7,4	7,1	9,2



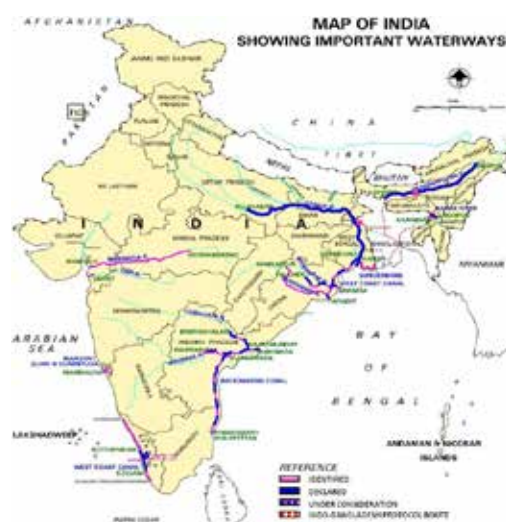
Unified Deep Water System of  
European Russia

## INSTC





## Indian Waterways



## Possible areas of cooperation

- Smart Ports
- Construction of the general type of river-sea vessels at Russian and Indian shipyards, the formation of new production chains and the creation of jobs
- Joint development of navigation systems
- Cooperation in environmental protection
- Development of riverine tourism



# REGULATORY FRAMEWORK AND POLICY IMPLICATIONS FOR BLUE ECONOMY GOVERNANCE MODEL TO PROMOTE SUSTAINABILITY IN INDIA-RUSSIA URBAN ECONOMICS, TRADE RELATIONS, AND PUBLIC RESOURCES: A CRITICAL ANALYSIS

CE Dr Sumanta  
Bhattacharya





## Introduction

- The Blue Economy, which includes sustainable sectors based on the water, has the potential to promote economic development, environmental sustainability, and social inclusion. This critical analysis focuses on the regulatory framework and policy implications needed for an efficient governance model of the Blue Economy.
- It notably considers the India-Russia urban economics, trade ties, and management of public resources. India and Russia, both having vast coasts and abundant maritime resources, are well positioned to gain significant advantages from the Blue Economy.
- Nevertheless, the actualization of this capacity need strong governance frameworks and policies that foster sustainability.
- The primary areas of concentration are incorporating urban economic strategies that promote the sustainable growth of coastal cities, coordinating trade policies to boost bilateral marine commerce, and effectively managing public resources to prevent excessive exploitation.
- Urban development policies focused on sustainability should give top priority to the implementation of green infrastructure, effective pollution control measures, and robust disaster resilience strategies

## Strengths, Weakness and Gaps

### India

- Strengths- Comprehensive initiatives like the Sagarmala Project promote economic growth through port development and improved logistics.
- Weaknesses-Fragmented regulatory landscape with overlapping jurisdictions, leading to enforcement challenges.
- Gaps-Insufficient integration of community participation and advanced monitoring technologies in resource management.

### Russia

- Strengths-Strong emphasis on strategic goals for maritime activities and a clear framework for Arctic resource management.
- Weakness-Heavy industrial focus, particularly in the Arctic, which can overshadow environmental concerns.
- Gaps- Lack of specific regulations for emerging sectors like marine renewable energy and marine biotechnology.

## Regulatory Framework

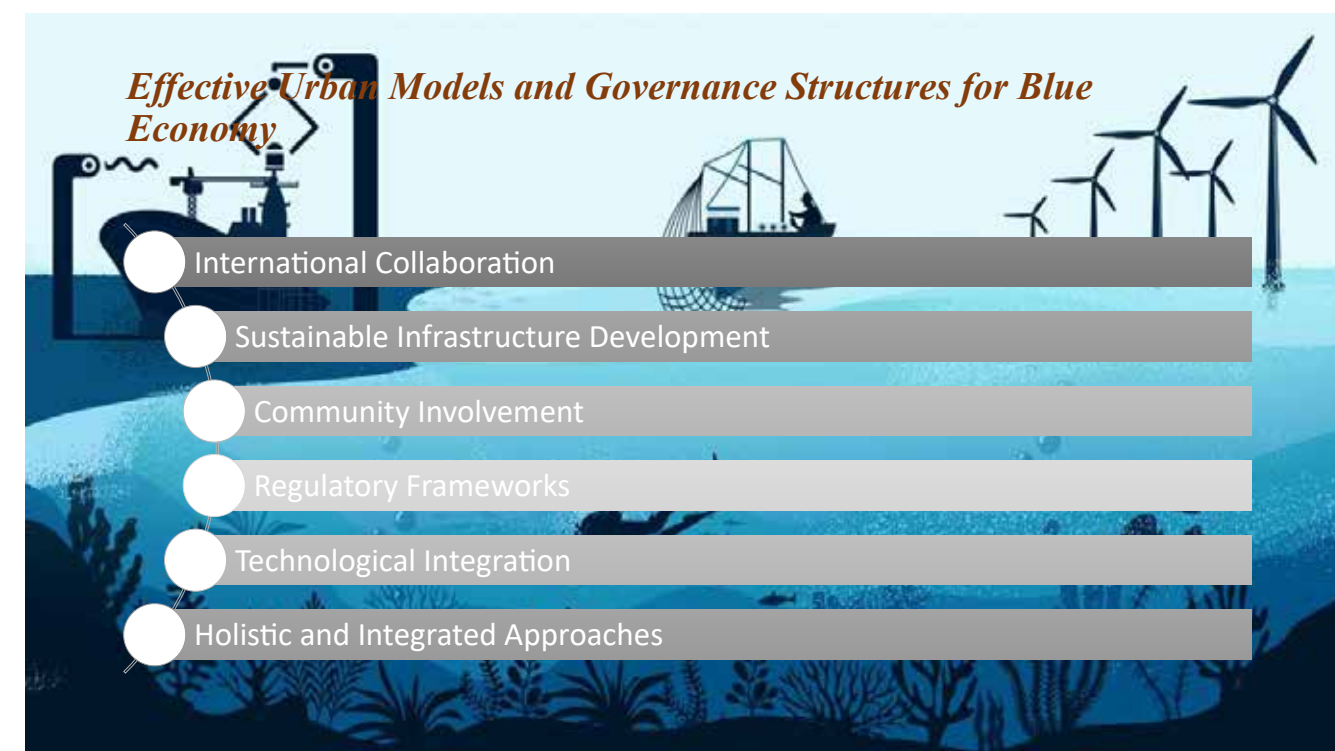
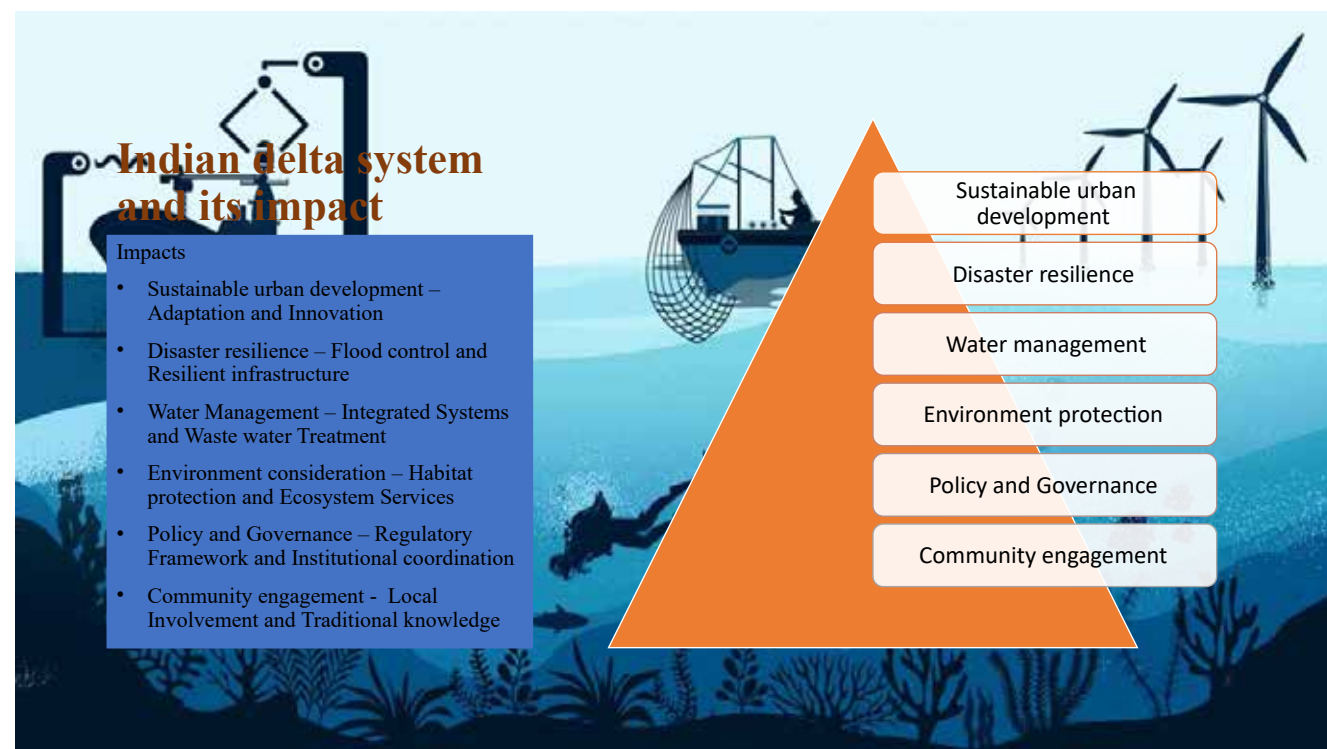
- ### India
- National Policy on Marine Fisheries (2017)
  - Sagarmala Project
  - Coastal Regulation Zone (CRZ) Notification
  - Marine and Coastal Regulation Zones (MCRZ)

- ### Russia
- Maritime Doctrine (2020)
  - Federal Law on Continental Shelf and Exclusive Economic Zone
  - State Program for Fisheries Development (2013-2020)
  - Arctic Strategy

## Role of Indigenous knowledge in Russian Urban economies









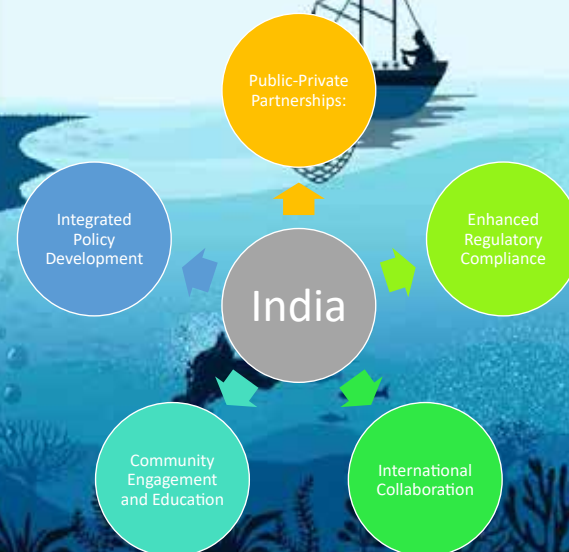
## Cont.

- Successful blue economy governance involves integrated management that balances environmental, economic, and social objectives.
- Both India's ICZM and Russia's ICM emphasize the importance of stakeholder involvement and ecosystem-based management
- The use of technology in urban planning and management, as seen in India's Smart Cities Mission, can significantly enhance efficiency and sustainability.
- Smart technologies for water and waste management are crucial for sustainable urban environments.
- Clear and enforceable regulatory frameworks, like India's CRZ Notification, are essential to protect sensitive coastal and marine areas. Regulations should be adaptable to evolving environmental and social conditions.
- Engaging local communities, as in India's National Policy on Marine Fisheries, ensures that policies are culturally appropriate and effectively implemented. Community-based management practices lead to better compliance and sustainability outcomes.
- Infrastructure projects, such as Russia's Arctic Strategy and India's Sagarmala Project, must incorporate sustainability principles to minimize environmental impacts
- Development initiatives should prioritize renewable energy, efficient resource use, and environmental protection
- Aligning national policies with international standards and best practices, such as Marine Spatial Planning, enhances the effectiveness of blue economy governance. International cooperation is vital for addressing transboundary environmental issues and promoting sustainable development.

## Russia



## Future Perspectives for India and Russia



## Conclusion

- The blue economy holds immense potential for sustainable development, economic growth, and environmental conservation. Both India and Russia can harness their vast marine resources to enhance their urban economies and improve trade relations.
- India and Russia have established foundational regulatory frameworks and policies to govern their blue economies. However, there are notable differences in their approaches, strengths, and areas that require improvement. India's regulatory framework emphasizes strict compliance, community engagement, and public-private partnerships, while Russia focuses on modernization, central planning, and government funding.
- Both nations face challenges such as financial constraints, technological barriers, and institutional resistance. However, these challenges present opportunities for innovation, international collaboration, and capacity building. Addressing these challenges through targeted strategies, such as securing international funding, investing in R&D, and fostering public awareness, will be crucial for effective implementation.
- Future initiatives should focus on enhancing regulatory compliance, integrating policy development, encouraging public-private partnerships, and fostering community engagement. International collaboration will play a vital role in aligning with global standards and accessing technical and financial support. Sustainable urban development, modernization of infrastructure, and capacity building are essential to address the evolving challenges of the blue economy.

# BLUE ECONOMY – PRACTICE AND SOLUTIONS

Oleg Vsevolodovich  
Bachinsky

## Blue economy – practice and solutions

- The “Blue Economy” involves the sustainable use of the resources of the world's oceans, based on three main principles: protection and conservation of water resources, environmental management and **the implementation of solutions for adaptation to climate change.**

The Ocean economy in 2030 OECD Publishing, 2016.



## Water as a destruction force

› Destruction of the dams in Sikkim, October,4 2023 and in Orsk, April,5 2024



Flood in Kerala, November 2023 and Orsk, April 2024



Flood in Sikkim 2023 and Orsk April 2024



Monitoring of water bodies using unmanned aerial vehicles (drones) and water boats





Flood monitoring. Modeling of the processes of flooding of the territory during floods and flood spills;

- The effectiveness of the UAVs (drones) use: work time on pre-flood and post-flood inspection is less by 50%.



### Shoreline and river bank monitoring

The effectiveness of the UAVs (drones) use: work time on water reservoirs monitoring is less by 30%.



### Monitoring of oil spills and contamination with waste water



Identification of places and sizes of accumulation of wood debris, garbage and excessive aquatic vegetation. Control of illegal economic activities in nature reserves, illegal fishing







# AC-32-10

## DESCRIPTION

The AC-32-10 plane-type unmanned aircraft system is designed for mobile monitoring and high-precision photography. The drone is most effective in aerial photography of large linear or area facilities. The flight time is five hours, which allows it to perform flights at a distance up to 350 km in one flight. The AC-32-10 hub is made of a composite material, which is highly durable, which significantly extends the service life of the drone and makes it possible to quickly repair

and maintain the aircraft even in field conditions. To date, these aircraft are successfully operated in eight countries around the world.

## APPLICATION

- High-precision aerial photography
- Multispectral photography
- Thermal imaging
- On-line monitoring
- In-line checks at emergency situations
- Exploration works

Parameters	Value
Flight time	1.5 to 5 hours
Flight speed	50 to 160 km/h
Engine type	Electric
Autopilot	Intelligent
The radius of the radio channel and video the aircraft	50 km
Maximum flight range	150 to 350 km
Take-off weight	90 to 140 kg
Payload	100 to 150 kg
Wingspan	3.05 m
Working height	50 to 7000 m
Operating temperature	-40°C to +40°C



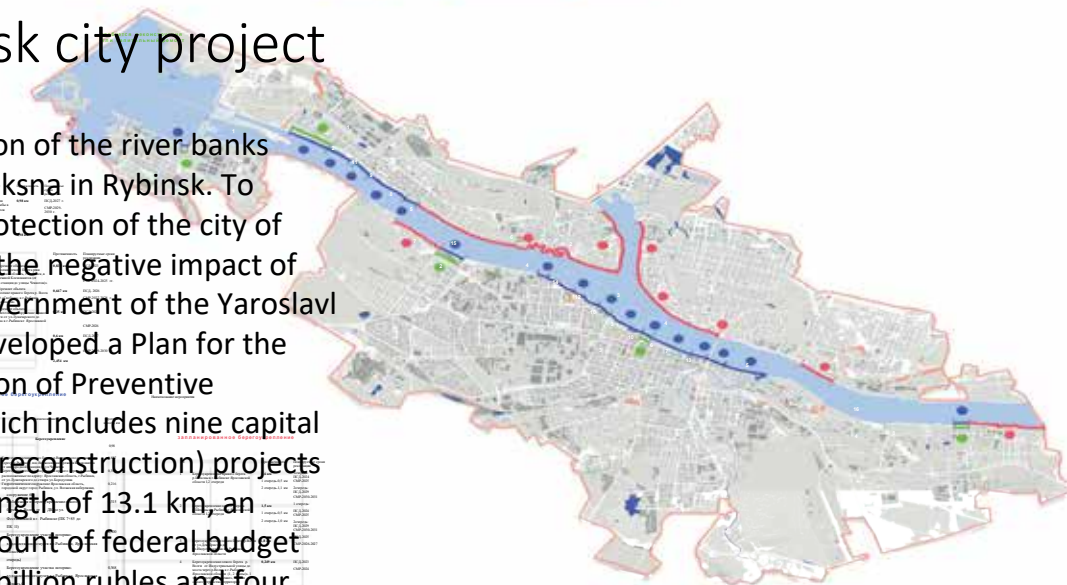


In order to increase the efficiency of state monitoring of water bodies, subordinate institutions of Rosvodresurs plan to purchase 100 units of unmanned aerial vehicles for the period from 2024 to 2030, including the "Light Aircraft" type - 16 units, the "Multirotor light" type - 84 units.



## Rybinsk city project

Bank protection of the river banks Volga and Sheksna in Rybinsk. To ensure the protection of the city of Rybinsk from the negative impact of water, the government of the Yaroslavl region has developed a Plan for the Implementation of Preventive Measures, which includes nine capital construction (reconstruction) projects with a total length of 13.1 km, an estimated amount of federal budget funds of 13.1 billion rubles and four facilities capital repairs of hydraulic structures with a volume of federal budget funds of 2.0 billion



## Pilot projects for issuing blue bonds



## Baikalsk city

- Coastal protection and construction of port infrastructure in Baikalsk. It is planned to be implemented within the framework of the program of socio-economic development of the Baikal municipality until 2040. Design and estimate documentation is under development. The preliminary amount of funding for bank protection is 2 billion rubles.





## Additional watering of the Volga-Akhtuba floodplain

Construction:— supply canal with a length of 32 km;  
- two gateway regulators;  
- four overflow dams on small rivers,  
- bank protection structures,  
- pumping station,  
- a hydroelectric power station with an installed capacity of 31.2 MW, through the generation of electricity from which it is planned to compensate for the costs of operating the facility

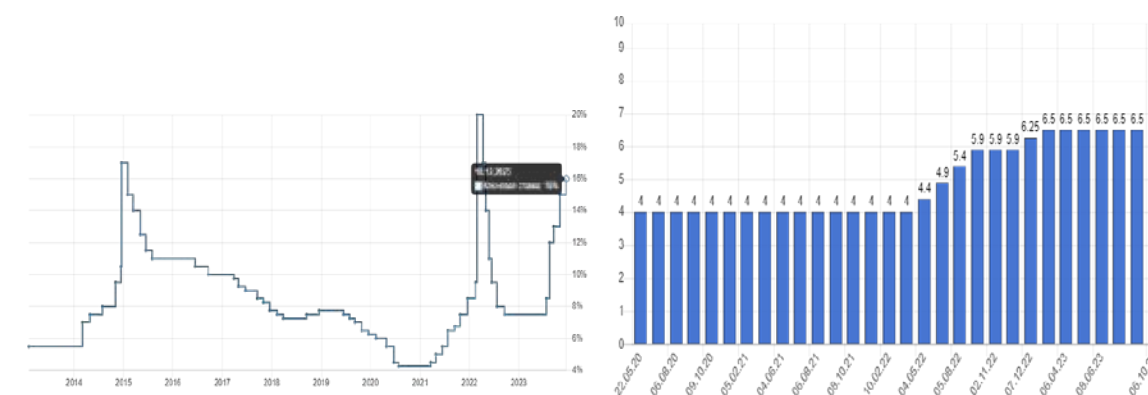


## Volga-Akhtuba floodplain

When implementing the project for additional watering of the Volga-Akhtuba floodplain, the following environmental problems will be solved:  
— improvement of the microclimate of the territory; — preservation of the unique ecosystem of the Volga-Akhtuba Floodplain Natural Park, including the preservation of 54 Red Book representatives of flora and fauna;— conservation of floodplain wetlands (UNESCO site). Additional watering of the Volga-Akhtuba floodplain will prevent damage to flora and fauna on 48.1 thousand hectares of floodplain lands, to birds of wetlands on 15.7 thousand hectares, and to aquatic biological resources on 14.4 thousand hectares of aquatic reservoirs.



## Central bank rates in Russian Federation and Republic of India



## Problems and solutions

- Central bank key rate of 16 % in RF / Existing deposit rate is 18 %
- Solution – contribution from the region (state) government to let the blue bond issuer to fulfill the obligations /
- Minimum commercial output of infrastructure projects
- Solution – combination of infrastructure and commercial projects
- Large-scale projects
- Solution –international cooperation

# GREEN ENERGY COOPERATION BETWEEN INDIA AND RUSSIA: THE POLICY CONVERGE ON SUSTAINABLE DEVELOPMENT

Dr. Debasish Nandy

## Green Energy Cooperation between India and Russia: The Policy Converge on Sustainable Development Goals

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### Introduction

- Green energy known as renewable energy, is energy that comes from natural resources that can be replenished on a human timescale and doesn't pollute the environment.
- Green energy is defined as energy derived from renewable sources. Green energy is also known as clean, sustainable, or renewable energy. Green energy generation emits no dangerous greenhouse gases into the atmosphere.
- Green energy sources are readily available on Earth and don't cause much harm to the environment.
- Solar power: Uses photovoltaic cells to capture sunlight and convert it into electricity.
- Wind power: Uses wind to generate energy.
- Hydropower: Uses the force of flowing or falling water to generate electricity through dams, tidal barrages, or run-of-river systems.
- Geothermal energy: Uses thermal energy from the Earth's interior by extracting heat from geothermal reservoirs using wells or other means.
- Bioenergy: Uses organic matter burned as a fuel.



## Sustainable Development Goals and Green Energy

- The concept of green energy has come to the fore as a strategic sustainable energy formation process for the whole world since last three decades.
- Sustainability has been called a key to the solution of current ecological, economic, and developmental problems.
- For sustainable development, green energy can play an important role for meeting energy requirements in both industrial and local applications.
- Sustainable development goals and green energy in UNO, BRICS, G-20

## Challenges of Green Energy

- High initial cost of installation
- Lack of infrastructure
- Power storage
- Non-renewable energy monopoly
- Lack of knowledge and awareness
- Lack of policies, subsidies, etc.

## Why Green Energy?

- Clean energy
- Inexhaustible energy source
- No carbon emissions or greenhouse gases
- Energy independence
- Self-sufficient
- Sustainability
- Environmentally friendly and slows down climate change

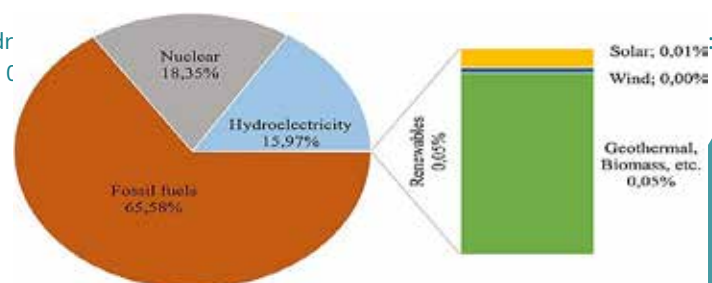


## The Green Energy Policy of Russia

- The objective of the energy strategy of Russia is to maximize the effective use of natural energy resources and the potential of the energy sector to sustain economic growth, improve quality of life, and strengthen Russia's foreign economic positions.
- The Strategy determines the objectives and goals of the Russian energy sector's long-term development.
- its priorities, and guidelines, as well as mechanisms of the state energy policy to ensure the realization of stated objectives.
- It includes State Energy Policy requirements and guidelines, pushing support for R&D as well as providing strategic development assistance.
- The Strategy sets a 56 percent energy intensity reduction target for 2030 (compared with 2005).
- It will be accomplished in three stages: the first is a major overhaul of the energy sector; the second emphasizes efficiency gains through new technology within the fuel and energy sectors; and the third stresses economy-wide energy efficiency.

## Green Energy in Russia

- Russia could rely on an economically viable 100 percent renewable energy system—wind and solar by 2030 (Neo-Carbon Energy Research Project in Finland).
- One of the important results is that the energy will be 50 to 80 percent cheaper than a fossil-fuel-based energy supply.
- Russia has 102 hydropower plants with capacities of over 100 MW, making it fifth in the world for hydropower production.
- Russia's nuclear power source is 18.35%, Hydr 0.01%, wind 0.00%, geothermal, biomass, etc., 0.05%.



## Why Russia Moves towards Green energy?

- Environmental security
- Following SDGs
- Decarbonization mission at a certain scale.
- 'race to replace' Russian gas with renewables and heat pumps by 2028 is €811 billion.
- This total includes planned spending of €299 billion on clean energy as part of the European Green Deal and an additional investment in renewable energy and heat pumps of €512 billion.
- Compulsions of 'climate negotiation'

## Green Energy Policy of India

- India's green energy policy focuses on increasing the contribution of renewable energy to the country's overall energy mix.
- In 2023, India also demonstrated leadership by steering the G20 under its Presidency to a common goal of tripling global renewable energy capacity globally by 2030.
- To mitigate the energy crisis.
- Reducing carbon intensity: India aims to reduce the carbon intensity of its economy by at least 45% by 2030, compared to 2005 levels.
- India aims to install 500 gigawatts (GW) of renewable energy capacity by 2030.
- This includes adding 10,000 MW of green energy from sources such as solar, hydro, and biomass.
- India's green energy policy also includes disincentivizing the use of coal, oil, and gas.
- India faces some challenges in implementing its policy, such as maintaining grid stability and ensuring a reliable power supply from intermittent renewable energy sources like solar and wind.

## The Scenario of Green Energy in India

- Wind power: 46.16 GW.
- Solar Power: 82.63 GW.
- Biomass/Co-generation: 10.35 GW.
- Small Hydro Power: 5 GW.
- India declared in 2019 that it would increase its installed renewable energy capacity to 450 GW by 2030.



## Green Energy Initiatives in India

- Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA)
- Green Energy Corridor (GEC)
- National Smart Grid Mission (NSGM) and Smart Meter National Program
- Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME)
- International Solar Alliance (ISA)



## Potentiality of Green Energy Cooperation between India and Russia

- Nuclear energy is sometimes referred to as a clean energy technology as it produces nearly zero carbon dioxide or other greenhouse gas emissions.
- Tarapur Nuclear Power Plant was constructed in a collaboration between New Delhi and Russia. The contract was signed between them in 1964.
- A total of 6 Nuclear Power Plants of 1000 MW capacity are being constructed in Kudankulam, Tamil Nadu with Russian participation.
- The new programme to be signed for a renewal of the Integrated Long-Term Programme (ILTP) of Cooperation in Science & Technology.
- As a first step, India and Russia plan to set up a joint venture for large-scale production of silicon wafers in Russia using abundant hydropower in Siberia, which is substantially cheaper than electricity generated in India.
- Projections indicate that the Indian EV market, valued at US\$2 billion in 2023 could surge to US\$7.09 billion by 2025. Industry estimates also forecast the domestic EV market to achieve 10 million annual sales by 2030.

## Green Energy Cooperation between India and Russia

- Both sides have expressed interest in expanding cooperation in the energy sector.
- Russia is helping India in constructing the Kudankulam nuclear plant and has other interesting projects.
- the Russian government aims to provide any special sops/incentives to Indian companies planning to enter/invest in the country.

## Why India?

- Russia has a long and trusted relationship with India.
- India has high demand of green energy.
- Russian capital can be used invested in India in the sector of green energy.
- The policy convergence on green energy between India and Russia.
- About 85% of India's territory under climatic threat (shortage of underground water, warming, etc.)

- To reduce green house gas.
- India has potential hydro-electric power projects.
- Long-costal area for wind-based electricity.
- India is an ideal place for solar-power.
- Potential Hydrogen power



## Conclusion

- 'Green Chanel' needs to be introduced in enhancing 'green energy'.
- Clean air projects.
- Green energy technology cooperation.
- Academia-Industry interface.
- Policymakers -industry coordination.
- Survey of market for potential cooperation.
- Involvement of local people in green energy projects.

