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Office of the Principal Scientific Adviser to the Government of India

SCIENCE & TECHNOLOGY CLUSTER

IUCAA

PUNE KNOWLEDGE CLUSTER

CITY KNOWLEDGE INNOVATION CLUSTER PKC

IMPACT REPORT
2020 - 2022

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VISION & MISSION

Pune Knowledge Cluster is established by the Office of the Principal Scientific Adviser, GoI (PSA) and hosted by Inter - University Centre for Astronomy and Astrophysics, Pune (IUCAA).

The O/o PSA aims to provide pragmatic and objective advice to the Prime Minister and cabinet on matters related to science, technology and innovation with a focus on application of Science and technology in critical infrastructure, economic and social sectors in partnership with Government departments, institutions and industry.

IUCAA is an autonomous institution set up by the University Grants Commission (UGC) of India to promote the nucleation and growth of active groups in astronomy and astrophysics at Indian universities. IUCAA aims to be a centre of excellence within the university sector for teaching, research and development in astronomy and astrophysics.

Vision

The Pune Knowledge Cluster (PKC) aims to bring together academia, R & D institutions and the Industry of Pune and its surrounding areas, to address challenging problems of the region through innovative means, using scientific knowledge and engaging highly skilled human resources.

Mission

To act as a catalyst to bring together the large talent pool present in Industry, Academia, Government and non-Governmental organizations of Pune to brainstorm, discuss and identify projects of importance and of value to the region and to execute them through collaborative efforts.

PUNE KNOWLEDGE CLUSTER LEADERSHIP

Prof. Ajit Kembhavi
Principal Investigator

Prof. L. S. Shashidhara
Co-Principal Investigator

Prof. Somak Raychaudhury
Director, IUCAA

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Former Director - General, CSIR

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Co - Chairman,
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LEADERSHIP PERSPECTIVES

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Chairman, Advisory Committee, Pune Knowledge Cluster

Prof. Somak Raychaudhury
Director, IUCAA (Host Institution of PKC)

Dr. Priya Nagaraj
Chief Operating Officer, Pune Knowledge Cluster

Prof. Ajit Kembhavi
Principal Investigator,
Pune Knowledge Cluster

Prof. L. S. Shashidhara
Co-Principal Investigator,
Pune Knowledge Cluster

The idea of setting up a knowledge cluster in the Pune region was conceived in late 2018; at that time the objective was simply to bring together various institutions in Pune to a common platform for inter-disciplinary projects and capacity building. But discussions with the then Principal Scientific Advisor (PSA) to the Government of India, Professor K. Vijayraghavan and his colleagues led to the idea of a knowledge cluster much broader in its scope with participation by institutions as well as other organisations. The first discussion meeting regarding the cluster was held in January 2019. That was followed by a few town hall meetings called by the PSA and the then Scientific Secretary at the PSA's Office Dr. Arabinda Mitra. From these meetings the idea emerged of a Pune Knowledge Cluster (PKC) of academic institutions, R&D organisations, industries, NGOs and civic and governmental bodies to work together to address some of the problems faced by the city and the surrounding regions, in a knowledge based and data driven manner. A proposal was made to the PSA's office for support for the PKC and approval was received in February 2020, just at the beginning of the pandemic.

The first problems to be addressed by the PKC, even before the formal beginning of the cluster in August 2020, were issues related to the pandemic, which are described in this impact report.

The verticals of interest to the PKC are health, sustainability & environment, sustainable mobility, Big data & AI, and capacity building. In these verticals our focus has always been on those projects which require multi-disciplinary and multi-institutional participation for providing long-term and sustainable solutions to the city's problems. To define projects and for their implementation, we initiate a series of brainstorming meetings with diverse sets of experts in each vertical and we seek funding for them from government agencies, foundations and CSR initiatives of the industry. Several projects have been initiated in this manner and others are in advanced stages of finalisation. We have already demonstrated our ability to manage city-wide and multi-institutional projects, as the stories in this impact report will show, thus fulfilling to some extent at least, an important mandate of our cluster. We have also contributed substantially to capacity building among the youth in city and a wider region.

In the two years of its existence the PKC has grown into a dynamic organisation with a staff of about 25 very talented, dedicated and hardworking people, who convert ideas to reality. We have received help from every organisation that we have approached, and funds from the PSA's office as well as a number of other sources. We have also been inspired and guided by a host of distinguished individuals in the city and beyond, and our Advisory Committee. Without all that support, our ideas would have still remained on paper. For the two of us this has been a wonderful journey, not easy and often out of our own comfort zones, but always immensely enriching and fulfilling.

Dr. R. A. Mashelkar
FRS,
Chairman, Advisory Committee,
Pune Knowledge Cluster

I have been the chairman of the Advisory Council of Pune Knowledge Cluster (PKC) for two years now. I would consider PKC as a highly successful S&T cluster, almost an exemplar. There are five reasons for my making this statement.

First, it has done something that was much needed, but was not achieved in the city of Pune. That is to bring together not only Academia, R & D institutions and the industry, but also all other stakeholders, like NGOs, the civic bodies and so on, and like never before. The Office of the Principal Scientific Adviser, GoI deserves a loud applause for this initiative.

Second, Knowledge Clusters can't be just clustering knowledge, they must go beyond knowledge and facilitate converting knowledge into wealth and social good. It is not the power of ideas, but the power of execution that matters. That means action that brings together both generators of knowledge but also the users. PKC has followed an end to end approach, helping move from ideas to impact, in multiple activities that it has undertaken. Their partnering with civic bodies like Pune Municipal Corporation, Pune Zilla Parishad, R&D organizations, hospitals, etc is a case in point.

Third, PKC has focussed on problems that 'need' to be solved rather than those that 'can' be solved. In other words, focusing on the 'need' of the hour. For instance, during the pandemic PKC rose magnificently with great projects that aligned itself with Integrated Disease Surveillance Project and contributed through sero-survey, genomic and environmental surveillance, long term immunogenicity studies, etc.

Fourth, PKC has done the magic of MLM, meaning More from Less for More, a term that I had coined in 2008, while proposing the concept of Gandhian Engineering. This means getting 'more' output from 'less' resources for impact on the lives of 'more' and more people. PKC has spent just Rs 3 CR in two years, but managed to forge 60 national and international partnerships and raise Rs 5 CR plus of their own funding to support their projects. This is a brilliant example of the trust and confidence that PKC has been able to win.

Fifth is the visionary leadership, which has admirably leveraged talent, technology and trust. At present, 80% of the PKC team comprises women. The CEO and two of out of three Senior Advisors are women. This is inclusion of the highest order.

These are the five reasons that have given me the confidence to say that PKC is an exemplar. Some of the lessons learnt and models developed at PKC could be followed by other Knowledge Clusters.

Prof. Somak Raychaudhury
Director, IUCAA
(Host Institution of PKC)

I am very happy that the Pune Knowledge Cluster, in its first two years, has achieved its current form and extent, and has already established itself as an important operation, to bring together the skills and talent available in the academic and research institutions and in industry in the greater Pune area, in order to tackle the important ongoing and emerging problems of the region. I feel privileged that my institution, the Inter-University Centre for Astronomy and Astrophysics (IUCAA) was chosen, by the office of the Principal Scientific Advisor to the Government of India, to host this cluster at its inception.

It was very exciting to see the cluster take shape in its early days, with various participants and possible stakeholders coming together in various groups to explore how this novel concept might help enhance synergies inherent in their activities. IUCAA, with its long history of local collaborations between academia and industry and inter-disciplinary and international academic research, was a natural locus for these discussions.

These two years after the cluster was formally started have been dominated by the challenges posed by the COVID-19 pandemic and its associated exigencies. However, the adversities brought together the various partners in many unprecedented ways. PKC and IUCAA members played a very important role in these activities, working with industry and local government, enhancing and facilitating the various efforts which have now led to singular achievements far beyond the initially planned public health and disease related exercises.

At the two-year mark, the Pune Knowledge Cluster has actively collaborated with research groups and industry and raised external funding from national and international sources. Substantial work has commenced in all the focus areas of public health, environment, sustainable mobility, data analytics and capacity building, and I am very happy to see that academic institutions, including IUCAA, and industry are participating in equal measure. An underlying theme in all the research areas is the application of artificial intelligence-driven data handling initiatives, which is powered by one of the strong areas of activity and expertise in the Pune region. Our dream is to reinforce the skills training programmes, and to involve academia and industry in improving the long-term living conditions of the citizens of the region, in a way that the catalysis that the cluster offers adds up to much more than the sum of its parts.

Dr. Priya Nagaraj
Chief Operating Officer,
Pune Knowledge Cluster

The City Knowledge and Innovation Cluster initiative by the Office of Principal Scientific Adviser, GoI is a nascent project in India. While focused ecosystems have existed for many years, the idea that organized cluster thinking can significantly influence growth strategies and enhance quality of life in a city (going forward state and nation) is being explored for the first time at the national level through Knowledge and Innovation Clusters like the Pune Knowledge Cluster.

PKC, over the past 2 years has stayed true to its mandate by enabling meaningful and fruitful partnerships between diverse stakeholders, all working towards a common goal – leveraging S&T capabilities of institutions and individuals to work for the betterment of Pune city. Most of PKC's initiatives have been initiated and implemented through a participatory and consortium approach. Organizations that are part of these consortiums have achieved much more than what they could have achieved individually, by pooling their infrastructural and intellectual resources.

PKC was incepted during the pandemic which dictated the way we worked for a good part of two years. The pandemic also proved that when organizations agree to collaborate and work together, their people find ways to reframe challenges as opportunities. PKC leveraged this to build strong knowledge and innovation networks in the city. In order for us to sustain these efforts, we require the support of various stakeholders who see value in contributing to building a robust cluster ecosystem.

I am grateful for the commitment and resilience shown by the founding team who pushed through tumultuous times to uphold PKC's mission and lay the foundation for our organization to achieve scaled outcomes. The impact and achievements highlighted in this report are a testament to their hard work. This report intends to give you a glimpse of PKC's journey so far.

PKC AT A GLANCE

29 National Collaborations

3 International Collaborations

73

Workshops/ Webinars/ Training Programs

5,733

Beneficiaries

INR 5+ Cr

Funds Raised

8

Externally Funded Projects

Executive Summary

The Office of the Principal Scientific Adviser (PSA) to the Government of India has established Science & Technology (S&T) clusters in various cities in India. Their purpose is to bring together academic institutions, research and development (R&D) laboratories, industry and local administration to address challenging problems of the city and region where the cluster is located. The clusters were set up on recommendation by the Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC), and are guided by a Cluster Apex Committee, chaired by the Vice-Chairman, NITI Aayog. The first set of clusters has been established in six cities of India, namely Bengaluru, Bhubaneswar, Delhi, Hyderabad, Jodhpur, and Pune.

Pune Knowledge Cluster was established in August 2020. Pune was chosen for establishing a cluster because of the many academic institutions, R&D labs and knowledge-based industries present in the Pune Metropolitan Region (PMR) which is larger than the region covered by the Pune Municipal Corporation (PMC) and surrounding areas, which together constitute the Pune region.

The PKC is currently administered by the Inter-University Centre for Astronomy and Astrophysics (IUCAA) and is on its way to becoming a Section 8 Company. It has its office on the campus of S. P. Pune University. It has a small staff including a Chief Operating Officer, Senior Advisors, Program Managers, Assistant Program Managers and scientific and technical experts working on specific projects. The PKC has an Advisory Committee consisting of eminent scientists, technologists, industrialists and heads of institutions. Funds for the operation of the PKC and seed funding for projects are provided by the O/o PSA, while the main funds for projects are obtained from CSR programmes of companies, foundations and other funding agencies.

The objectives defined by O/o PSA for S&T clusters in India include the following
- Building of a shared ecosystem in the region
- Becoming a regional solution provider
- Becoming nationally and globally competitive

Objectives of the S & T Clusters
(Pic Credit : https://www.psa.gov.in/st-clusters)

Pune Knowledge Cluster has been systematically working towards these objectives since its inception under the following verticals:

- Health
- Sustainability and Environment
- Sustainable Mobility
- Big Data and AI
- Capacity Building

Building of a shared ecosystem in the region

Pune city is a hub of premier national level research institutions and innovation driven industries working in frontier areas of IT, health, environment, manufacturing, automotive etc. PKC has built a conducive ecosystem for various types of organizations to engage and collaborate for projects that have and will continue to benefit the city. PKC has worked with 60 partner organizations and has MoUs/MoAs with 30 of them including research and academic institutions, industries, societies and associations, NGOs, civic bodies and incubation centers.

Becoming a regional solution provider

PKC has remained focused on programs involving citizens and civic bodies to address problems which have local relevance. These include programs like city level surveillance of COVID-19 during the pandemic, programs for enhancing the tree cover in the city and introducing technology-based teaching and learning methods in government schools. PKC has developed and launched 2 platforms to encourage citizens to participate and contribute to scientific data collection and curation. PKC has also served as a knowledge partner for the Pune Zilla Parishad, where it has facilitated technology feasibility studies for community biogas plants, creation of water management plans for water stressed villages etc. and has conducted a large STEM program for teachers of Zilla Parishad schools.

Becoming nationally and globally competitive

The work done by Pune Knowledge Cluster on various regional issues has been carefully mapped to the objectives of various National Missions to foster local and national capabilities. Moreover, the solutions for the local problems have been carefully designed so that they take India a few steps further towards achieving targets of the United Nations 2030 Agenda for Sustainable Development with the help of national and international collaborations. PKC's ongoing projects across verticals align with 8 UN Sustainable Development Goals and 17 National Missions.

In October 2022, PKC signed an agreement with Water Valley, Denmark, which is a water cluster to collaboratively work on enabling innovation and adoption of water technologies. PKC's COVID-19 projects are also part of a bigger national initiative implemented in three cities in India.

Funding Partnerships

PKC is supported with funds by the Office of the PSA for operational expenses and seed grants for initiating projects. The cluster has also raised additional project funds worth INR 5CR+ from various national and international agencies through CSR programs, foundation grants etc. The PSA's office has proactively helped in such fund raising, systematically connecting the cluster to potential donors.

PROJECTS

I. Health

PKC's Health vertical has collaborations across academic and industry, NGOs and Govt departments in generating data critical for public health decisions such as sero-surveys, clinical, immunological, and environmental surveillance and creating an epidemiological database with comprehensive health information for Pune and access to real-time data. During the pandemic, PKC managed five COVID-19 projects in the city in collaboration with 10 partner organizations including research institutes, hospitals, pathology labs and government bodies.

Projects include

- COVID-19 Data Analysis and Forecasting for Pune City
- COVID-19 Sero-Survey
- COVID-19 Disease Surveillance (Genomic and Environmental)
- COVID-19 Long-Term Immunogenicity Study
- COVID-19 Epidemiological and Clinical Database for Pune
- Development of an Early Warning System for Infectious Diseases

II. Sustainability and Environment

With the core emphasis on sustainability and climate action, Pune Knowledge Cluster supports India's commitment to the 2030 Agenda, by performing status quo assessments, developing monitoring systems and implementing sustainable solutions for environmental problems. PKC's Sustainability and Environment vertical currently has three priorities:

- Programs for Sustainable Increase of Vegetation Cover
- Programs Monitoring the Environmental Evaluations
- Policy Advocacy - Water Action Plan for Pune Metropolitan Region and National Biomass Policy

III. Sustainable Mobility

PKC's Sustainable Mobility vertical aims to apply scientific and technical tools to address the rapidly growing and changing mobility requirements of the city. We wish to support the development of sustainable solutions toward carbon-neutral transportation. Working towards the Smart City Mission of GoI, the Pune city-administration is encouraging and enabling sustainable modes of mobility.

Current focus areas include:

- Vehicular E-Waste Recycling-Projects are being conceptualized with technology providers and the auto industry to pilot novel technologies for vehicle E-waste recycling at the city level through public-private partnership models
- Contributing to policy making for adoption of alternate (green) modes of transport

IV. Big Data & Artificial Intelligence

This vertical enables the development of various AI-driven Consortium for basic and applied research. Large-scale citizen science programs are being developed to involve citizens in analyzing big data to foster scientific temper. One such program is called One-Million Galaxies where 1000+ citizens have analyzed over 25 GB of data (images of galaxies) on PKC's platform. PKC is also building collaborative projects between BIG Data and AI experts, chemists, and biologists to encourage inter-disciplinary skills and research through an AI consortium for Biology and Chemistry.

V. Capacity Building

The capacity-building vertical of PKC aims to provide new opportunities to students, young researchers, and professionals to improve their knowledge base and acquire advanced skills through the following programs:

- Interdisciplinary Training Programs & Courses: Contemporary skill-building and knowledge enhancement

- Citizen centric science talks by experts
- STEM Education

PKC has conducted over 14 workshops and courses benefiting over 3000 stakeholders.

PKC's STEM education vertical focuses on promoting STEM education through technology-enabled training programs for school teachers and students, scholarship programs for women in STEM, gamification of learning, and setting up of STEM Labs.

CONCLUDING REMARKS

We have summarized above some key elements and projects of the PKC. Those are all described in greater detail in the following pages of the report. Most of our projects are multidimensional and interdisciplinary; they involve collaboration between a number of people and organisations and their common aim is to bring benefits to society. It is hard to convey through the written word alone the excitement that is felt in working on the projects and taking them towards completion. Hopefully the reader will get a flavour at least of PKC's journey over the past 2 years.

PARTNER PERSPECTIVES

Dr. Pramod Chaudhari
Founder - Chairman, Praj Industries Pvt Ltd

Dr. Sanjay Juvekar
Vadu Rural Health Program, KEM Hospital Research Centre, Pune

Lt. Gen. Dr. Madhuri Kanitkar (Retd)
Vice Chancellor, Maharashtra University of Health Sciences

Mr. Dinanath Kholkar
SVP, Global Head of Partner Ecosystems & Alliances, TCS

Mr. Sanjay Kolte, IAS
Chief Executive Officer, Pune Smart City Development Corporation Ltd.

Dr. Satyajit Mayor
Chairperson, (BLiSC), Centre Director, NCBS-TIFR

Ms. Sanskriti Menon
Senior Programme Director, Centre for Environment Education, Pune

Dr. Nikhil Phadke
Founder - Director, Chief Scientific Officer, GenePath Diagnostics

Dr. Sapna Poti
Director, Strategic Alliances Division, The Office of PSA, GoI

Mr. Ayush Prasad, IAS
CEO, Pune Zilla Parishad

Dr. Pramod Chaudhari
Founder - Chairman
Praj Industries Pvt Ltd

At the outset I wish to compliment office bearers and staff of Pune Knowledge Cluster (PKC) on successful completion of two years of existence. As a member of the Advisory Committee from the very inception I have been watching PKC's evolution from close quarters and I do wish to record my sincere appreciation of various initiatives and progress therein. True to its vision PKC is able to galvanise academia, R&D institutions, Industry to address important challenges using science and technology platforms.

It is heartening to note that within a two year time frame, PKC is able to build partnerships with 60 organizations in India and abroad in priority areas of health, sustainability & environment, Big Data & AI, sustainable mobility and Capability Building. I am impressed to note that PKC has also been able to mobilize funding of INR 5 Crores by way of grants and CSR funding from corporates to support various projects.

I admire PKC's contributions during COVID period in generating data critical for public health decisions and ongoing endeavours in compiling comprehensive health information for Pune and facilitating access to real-time data. We are witnessing ill-effects of climate change on humanity and I feel reassured that PKC has initiated concrete steps to establish biodiversity, taking firm steps aimed at carbon sequestration and biomass generation. Importance of water as a precious resource need not be overemphasised and I am glad that aligned with the National Water Mission, PKC is developing a sustainable water management plan for the Pune district.

I noted that to harness the true potential of big data and AI, PKC has teamed up with experts to build collaborative interdisciplinary research projects. I laud PKC's work in the area of capacity building that is aligned with Skill India Mission and National Education Policy. This will go a long way in leveraging demographic dividend – nation's competitive advantage.

Recognizing that decarbonization of the transportation sector has a big role to play in the fight against climate change, our company Praj is working closely with PKC. We are actively participating in national and international symposiums organised by PKC to create awareness about sustainable climate actions amongst stakeholders and foster partnerships.

Our Bio-Mobility platform of technologies for production of low carbon biofuels is very well received as a part of the sustainable mobility initiative of PKC. Bio-Mobility has synergies with PKC's overarching objective of sustainable development and is recognized as socio-economic-environmental growth enablers for the nation. Praj is associated with PKC on various strategic projects such as encouraging community biogas projects in Pune, biomass/energy crop cultivation on barren lands, etc. Giving complementary strength, I am certain that these initiatives will fructify in a big way.

Demographic dividend is India's cutting edge in the global economy and to leverage its full potential we need to arm our talent pool with contemporary knowledge and skills. I have a strong conviction that technology has the prowess to change the world for the better and create meaningful employment opportunities. In this regard, I endorse PKC's ambitious plan of setting up a Centre of Excellence for STEM education.

I believe PKC has an important role to play in helping realize the Hon. Prime Minister's vision of turning India into a developed nation by 2047 which is one of the "Panch Pran" mandates. I have full confidence that the partnership between Praj and PKC will help Pune endure its reputation as the innovation capital for biotechnology.

Dr. Sanjay Juvekar
Vadu Rural Health Program, KEM Hospital Research Centre, Pune

I would like to congratulate PKC on completing 2 years with some very notable achievements. In my interactions with PKC, I have been pleasantly surprised to see how a small team with leadership can generate a cluster of collaborators who are very much like-minded though with varied experience & expertise.

Incepted during the pandemic, PKC had the foresight to initiate some very important work at the city level for COVID-19. KEMHRC, Vadu was privileged to be associated with PKC for collaborative studies, including the VISION101 study which aims to understand the differences in magnitude and longevity of humoral and cellular immune responses generated following COVID-19 vaccination. Another study which we worked together on involved digitization and curation of retrospective data from confirmed hospitalized COVID-19 cases. These efforts will help in identification of correlations between virus genetics, clinical presentation, and the potential impact of interventions using machine learning and systems biology approaches. This is also an important capacity building exercise for all partner hospitals to venture into enhancing usability of hospital records which otherwise remain unutilized. Working with the PKC Team has been a pleasure because it gives a good sense of togetherness and confidence that data as well as knowledge generated will be used responsibly for the benefit of humankind.

I envision a much bigger role in strengthening the Science & Technology ecosystem of Pune, Maharashtra and going forward the nation.

PKC should act as a bridge between:

- Institutions involved in doing similar research work so that more representative evidence could be generated
- Institutions involved in different research work so that more interdisciplinary or integrative evidence could be generated
- Funding agencies and research institutions to enable forming a network of like minded people & institutions in Pune
- Evidence and practice by making available, all appropriate data or evidence to those in need especially the public systems and other policy makers
- Next generation of scientists, students and institutions doing work related to national priorities
- Science and citizens of Pune

I look forward to many more initiatives where PKC and KEMHRC,Vadu can collaborate and work together.

Lt. Gen. Dr. Madhuri Kanitkar (Retd)
Vice Chancellor, Maharashtra University of Health Sciences

In a short time span the PKC has achieved major milestones towards the goals entrusted to the City Clusters under the Office of the PSA GoI. The vision and growth along the set path is noteworthy.The aim of bringing together Academia, Research Organizations, Industry and local stakeholders including citizens to find solutions for local problems with global relevance has been amplified as noted in the report.

A special compliment to PKC for harnessing the local community for COVID related research and providing inputs to local governance. PKC enabled genomic analysis of over 15,000 COVID-19 samples, which accounts for 2% of all positive samples from Pune. This also resulted in a significant representation of Pune's cases on the national INSACOG platform (6% of data on the INSACOG platform for COVID-19 is from Pune).

The initiative to include a large number of the scientific community available in Pune has a huge potential for growth and I am sure in times to come the Cluster will support initiatives beyond the initial members and find innovative solutions in the area of Health, Environment, Big Data and AI and Mobility.

The Afforestation and Water Action Plan for Pune by PKC will be a huge project aligned to the National Action Plan on Climate Change and I am sure will make a difference to the local environment. The ideas and outcomes of these initiatives can be replicated by other cities and towns which are crumbling under urbanisation. A digital decision-making support system is planned by PKC using time-series and real-time absolute data, GIS maps, and analytics. This I am sure will harness the S&T potential of the city breaking silos.

The future looks bright with plans to build a centre for water management in collaboration with Water Valley, Denmark as well as a centre for carbon sequestration and renewable energy. The world is looking towards India and is willing to collaborate with Indian Academia to find sustainable solutions.

Capacity Building through webinars and workshops can be a huge help for skilling youth beyond the classroom and degree courses. PKC can be in a position to facilitate transdisciplinary courses as envisaged in the NEP2020 document. These courses can be tripartite between PKC and two or more universities and prepare youth for the job market. The envisaged Centre with a focus on innovation in school education, gamification in learning, STEM labs, girl education, and Math Circles is the way forward.

Using digital technologies PKC can connect people from diverse backgrounds to come together to work for common goals. I wish the PKC the very best and am sure PKC will establish itself as a leader showing the advantage of effective collaboration.

Mr. Dinanath Kholkar
SVP,
Global Head of Partner Ecosystems & Alliances
TCS

The Pune Knowledge Cluster (PKC) has achieved its objective of being a catalyst in bringing together industry, academia, researchers, social organizations, and governmental bodies to address challenges faced by the Pune region. As an advisory member to PKC, Chair of Industry Relations at IEEE and in my leadership role at TCS, I feel proud to have witnessed and contributed to this collaboration between these august organizations. Dr Kembhavi's participation in the IEEE 2021 workshop on "Next Practices in Industry-Academia Collaboration" set the tone for our engagement. Despite the challenges posed by the pandemic post its inception, PKC has come a long way in establishing itself as a well known and respected brand in Pune. It has taken up projects of strategic importance in the areas of environment, climate change, renewable energy, and others. A striking example of the value added by PKC was their valuable contribution to Pune cities efforts towards COVID-19 response. PKC was able to leverage TCS' Digital Twin solution created by Dr. Vinay Kulkarni of TCS to model the complex structure of the region and to enable an appropriate response. This is just one example of areas which typically need lot of collaboration across different sectors. Such collaboration can effectively be enabled by a credible entity like PKC.

TCS CTO has offered wholehearted support and enabled participation of TCS research teams in PKC initiatives. TCS has been focusing on shaping up as a partner for PKC which can significantly enhance the impact of PKC programs.
Sustainability & environment are close to our hearts today. PKC was a strategic partner for TCS Sustainathon Pune, a major event organized by TCS in the year 2021 on the theme of waste management. Me and couple of my colleagues at TCS were privileged to be part of the Round Table on Waste Management organized by the Norwegian Consulate and PKC.

The other areas PKC is contributing to and can contribute even more are the ones which are of crucial importance to the community but are financially not viable or attractive for the private and corporate sector. Areas like sustainability, open data, climate change, circular economy, renewable energy, public transport, health, and agriculture could typically fall under this category. PKC can provide thought leadership and contribute to policy making by making long term investments in such areas. Data is pervasive and is increasingly enabling AI to tackle challenges previously found un-addressable. I believe that there is significant opportunity to leverage the capabilities of emerging digital technologies to address real world challenges. TCS' Digital Empowers platform can enable bringing together the innovative capacity of entrepreneurs, and supplement it with the resources of the group, to alleviate the most pressing societal and sustainability challenges that PKC is tackling. Specifically, Digital Empowers has been bringing together partners that can expedite transition to circular economy, transform product lifecycles, and prolong product life. I look forward to leveraging these tracks to further PKC's mission.

Going forward PKC should take up strategic projects with a view to enable creation of a community capable of solving complex problems that are characterised by a system of systems nature and high degree of uncertainty. It needs to nurture an ecosystem that can support such a community by directing its efforts towards capacity building, entrepreneurship development and empowering NGOs. I believe that there is an opportunity and look forward to scale the collaboration between PKC and the various Tata group companies in the region. TCS and Tata Digital could contribute to capacity building, Big Data and AI, Tata Motors as India's largest EV seller could perhaps share its views on sustainable mobility, and Tata Trusts could lead with its views on health and sustainability. I look forward to enabling this knowledge contribution from the Tata group to PKC. The energy and drive of the youth could be tapped effectively for the community by leveraging the internship space opened by the new education policy. Through such internship projects, PKC can play a significant role in leveraging innovative practices for evolving impactful solutions to address challenges faced by the Pune region.

Another possible space for PKC to contribute is through various networks nurtured by different professional bodies. For example, MCCIA has a strong network of MSMEs, PIC is well connected with eminent personalities and thought leaders. IEEE has vast network of students and professionals and drives interesting programs like Eureka & "STEM to STEAM". TCS has more than 50,000 employees in Pune and has implemented some impactful programs like GoIT to educate school students on IT.

To sum it up, we have had a synergic partnership and have an even greater opportunity to scale it to make a significant impact and help set up a high benchmark for other metros.

Mr. Sanjay Kolte, IAS
Chief Executive Officer,
Pune Smart City Development Corporation Ltd.

पुणे स्मार्ट सिटी विकास महामंडळ मर्यादित
PUNE SMART CITY DEVELOPMENT CORPORATION LTD.

Outward no. PSCDCL/PKC/424/2022
Dati: 15.09.22

TO WHOMSOEVER IT MAY CONCERN

The Pune Smart City Development Corporation Limited (PSCDCL) and the Pune Knowledge Cluster have had a successful collaboration since May 2021. The Pune Knowledge Cluster (PKC) approached PSCDCL last year, for a partnership on the PKC's program on Urban Forestry.

Improving climate resilience of the city is an important by-product of the Pune Smart City initiatives. The community engagement which is also a part of this program provides volunteering opportunities in the local communities for nurturing saplings planted by PSCDCL. This is an important step in stimulating citizen engagement and deepening the connection between the civic authorities and the citizens, as well as between the environment and the citizens.

A volunteering program requires significant work which was put up by the PKC with support from Centre for Environment Education (CEE, India). Nature Walks were conducted (26th February 22 at Oakwood Hills, Baner and 6th March 22 at Madhuban Society, Balewadi) and bamboo tree guards were installed to protect the saplings. The PSCDCL team, provided active support for these events. As a result of this effort, two citizen groups have come forward to "adopt" saplings in their neighbourhood. Paryavaran Sanrakshan Gatividhi is one of the groups that has committed their support towards nurturing saplings at Balewadi and establishing a model for government and citizen partnership.

PSCDCL has planted 20 thousand saplings in the smart city area. These have been planted along the roadsides, place-making areas, in school / college / hospital premises in PMC gardens and so on. The PKC's "Plant and Adopt a Sapling" program has tremendous synergy with the plantation initiative of PSCDCL. The Plant and Adopt a Sapling program is backed by a technology platform – ConnecTree – developed by the PKC. With ConnecTree, it is possible to demonstrate and monitor the planted saplings. As a pilot demonstration, ~300 saplings planted by the smart city have been successfully mapped onto this GIS enabled platform - ConnecTree. PKC consulted the PSCDCL team during the design of this platform to ensure that it could be integrated with the smart city infrastructure in the future.

Pune Knowledge Cluster have collaborated effectively to pilot this concept successfully during the past year. This would encourage improved survival rates for roadside plantations and the creation of additional carbon sinks where carbon is stocked within through these plantations as a way to offset residual emissions and counter existing and future trends of increasing carbon emissions. I hereby strongly recommend PKC for extending the program to other cities.

(Dr. Sanjay Kolte, IAS)
Chief Executive Officer
Pune Smart City Development Corporation Ltd.

PUNE SMART CITY DEVELOPMENT CORPORATION LTD.

Dr. Satyajit Mayor
Chairperson, (BLiSC),
Centre Director, NCBS-TIFR

I have been associated with PKC on multiple COVID-19-related projects since its inception. Environmental and clinical surveillance to identify genome variants of SARS Cov-2 and longitudinal study on immunological response to vaccination among diverse groups in Pune, Bangalore and Vellore, are some of the examples. PKC has been an active partner in all these efforts and its program management skills have been a key to the success of all our projects.

As a city cluster, I anticipate PKC playing a major role in putting together and managing large multi-faceted multi-organizational projects that facilitate public health research, policy and forecasting strategies. I strongly believe that given the multi-institutional nature of PKC, it can take a unique and proactive role in creating an effective pandemic or epidemic preparedness strategy for the Pune region, and this will undoubtedly serve as a template for many other regions, including ours in Bangalore.

Ms. Sanskriti Menon
Senior Programme Director, CEE

The Pune Knowledge Cluster is bringing science and technology applications to a range of issues for sustainable development in the Pune region. PKC is also fostering partnerships, thereby building on existing strengths and knowledge resources of civil society groups, industry, academia, and government entities. The backing and endorsement of the top scientific institution in the country helps to open doors and forge synergies among diverse actors.

For example, the ConnecTree initiative with CEE as a partner, is helping to prepare a database of tree plantations linked with individuals and groups who care for the saplings. The use of the ConnecTree app in a community engagement process that goes along with the plantation helps build interest, awareness, and a 'connection' to trees. In another initiative, PKC and its partners SPTM and CEE are conceptualizing the use of behavioural nudges to address mobility issues. Such application of scientific approaches and digital technology tools to address wicked issues along with locally embedded actors is expected to generate new knowledge, approaches, and on-ground initiatives.

We hope to see further development of systems understanding of critical issues in the Pune region, related databases and data collection processes. We also look forward to PKC creating inclusive platforms and processes for ideation and informed deliberation on critical sustainability issues: supporting green skilling and livelihoods in the Pune region, addressing air quality, water and waste water management, recycling and circular economy, mobility, biodiversity and nature-based solutions, heat stress, urban flooding and others that would enhance climate resilience.

Dr. Nikhil Phadke
Founder - Director,
Chief Scientific Officer,
GenePath Diagnostics

GenePath Diagnostics would like to congratulate Pune Knowledge Cluster on completing two years of operations. PKC has been a key partner of GenePath - a clinical molecular diagnostics and genomic testing and kit manufacturing company based in Pune, India and Ann Arbor, Michigan, USA - through the COVID-19 pandemic.

We would like to thank PKC, particularly Dr. LS Shashidhara, for all the suggestions, connections and assistance provided during the early part of the pandemic and helping with transport of critical raw materials for our COVID-19 kits and enabling evaluations of our kits at CSIR-CCMB for subsequent ICMR + CDSCO approval. At later points in the pandemic, GenePath and PKC had a highly successful partnership where PKC coordinated whole genome sequencing of SARS-CoV-2 clinical samples tested at GenePath at INSACOG partner labs like NCL and IISER, and many samples sequenced across country during the middle to late stages of the pandemic came from this partnership. In fact, this was the very study during which the first patient infected with the Omicron variant of concern in Pune city was identified and sequenced within three days of initial testing at GenePath.

In parallel, PKC has also been a key partner with organizations across the country that have been using GenePath quantitative SARS-CoV-2 RT-PCR kits to monitor viral abundance in waste-water samples. This work has allowed advance prediction of localized spikes through the multiple waves seen in the country without the need to test individuals. In addition to all the practical benefits of the work carried out by the PKC-led coalition during the pandemic, there has also been a tremendous building of community, pan-organizational collaboration, and academic progress.

We look forward to a continued long-term mutually beneficial association between all the partners under the PKC umbrella.

Dr. Sapna Poti
Director,
Strategic Alliances Division,
The Office of PSA, GoI

The Pune Knowledge Cluster (PKC) has been one of the pioneers in leading the way for Indian Science, Technology and Innovations clusters. The cluster has redefined India's growth story in various areas of science and technology. Their leadership i.e. Dr. Mashelkar, Prof. L.S.Shashidhara, Prof. Ajit Khembavi and Prof. Somak Raychaudhury have been inspirational to the cluster institutions. The COO, Dr. Priya Nagaraj has been dynamic in leading various initiatives in Health, Capacity Building, Sustainability & Environment and Mobility.

The cluster has worked closely with the State Government and made an impact during the pandemic within the State and the Nation at large, especially in surveillance and genome sequencing. The working model that the cluster architected and leveraged during the pandemic has also formed the core of high impact success that the cluster is experiencing consistently post pandemic in all their Science and Technology projects as well. Focus has been on sustainability and scalability.

Since its formation the cluster has focused on both fundamental and applied R&D Projects balancing it appropriately. They have forged effective partnerships with Industries and harnessed all collaborations that were shared by the office of the PSA, GoI seamlessly along with their own efforts of Industry engagements. The cluster has focused in areas that are of National importance and has gone beyond its mandate of focusing on the State. Several National programs have been designed in areas of Genome Sequencing, Environment, Health, Big data and AI, STEM education and implemented throughout the Nation. PKC has managed various partners of eminence such as BASF Chemicals India Pvt Ltd, Hindustan Unilever, Rockefeller Foundation, Persistent Systems, Lenovo India Foundation.

Further, the cluster has excellent inter-cluster relationships and has collaborated as well as worked extensively towards capacity building of other clusters and institutions across the Nation. Currently several newer organizations are looking to engage with PKC in various capacities including setting up of relevant Centers of Excellence, National Gamification Repositories, Mobility initiatives and more.

Though the Cluster is fairly young the results have already been demonstrated by the team and is a testament to the impact the cluster has made to the current Science and Technology ecosystem in the Nation. Wishing the leadership of the cluster and all its institutes, startups, industry partners and state Government good luck for its future endeavours.

Mr. Ayush Prasad, IAS
CEO,
Pune Zilla Parishad

We started interactions with the Pune Knowledge cluster about a year ago on a few focus areas of interest to the Pune Zilla Parishad. We had several meetings over many months discussing projects for school improvement, STEM education, community biogas and water conservation initiatives.

PKC in collaboration with the District Institute of Education and Training (DIET) conducted a survey with 1500 + Zilla Parishad school teachers to understand learning gaps as a result of the pandemic. On the basis of the survey, PKC designed and conducted an online workshop for school teachers called "Concepts in Science and Skill Development" in association with the Pune Zilla Parishad and DIET. The workshop focused on training teachers from Zilla Parishad schools to use digital technologies and methods for teaching. 450 teachers participated in the workshop and it was well received.

We also had several detailed meetings with PKC about a community biogas project which ZP aims to mobilise in villages strengthening the existing 400 Biogas plants. PKC contributed by providing economic and technology feasibility analysis for the project and also advised on how solid waste and agricultural waste from villages can be used to make CBG leading to overall socio-economic development of villages.

The Pune Zilla Parishad has identified 108 water stressed villages in Pune district which are in need of interventions for water conservation. PKC undertook a study for one such village, Washere in Khed Taluka to holistically understand water issues in the village. They interacted with the local community, used experts from the Cluster to do GIS based mapping of the region and plan where water bodies could be constructed. PKC mapped 12 locations for creating water storage systems and submitted the map to Zilla Parishad.

A science and technology driven Cluster that facilitates bringing together various stakeholders to work for the betterment of the city is essential for the growth and development of a city like Pune. I see immense value in supporting an initiative like this and look forward to working with PKC on many more initiatives going forward.

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HEALTH

> “Vaccination, testing and surveillance were vital to check the Covid spread and emergence of new variants in India. It is crucial to strengthen surveillance (SARI, ILI and wastewater monitoring) to understand how the virus is circulating in the community. We should also sequence a small percentage of the circulating viruses to know if there are new emerging variants. The data should be shared globally. If every country does this, we can stay ahead of the virus”
>
> **Dr. Soumya Swaminathan,**
> Chief scientist, World Health Organisation (WHO)

Pune was one of the worst hit cities in India during the COVID-19 pandemic. Being need of the hour, the Pune Knowledge Cluster played an integral role in supporting the public health system and government strategies aimed at disease containment and management.

PKC's COVID-19 efforts focused on comprehensively understanding the epidemiology of the SARs-CoV-2 virus and work toward strategies to mitigate and reduce the disease burden in the Pune region (Fig. 1).

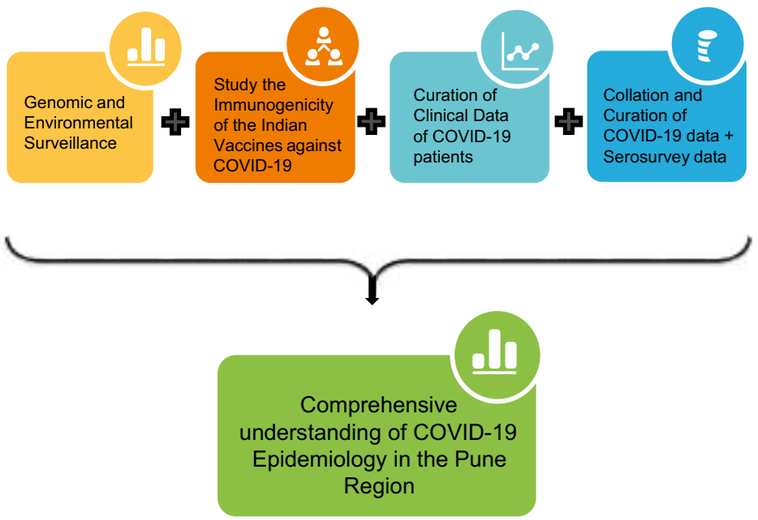

Fig. 1: PKC’s strategy for understanding COVID-19 comprehensively at the city level

Projects of this vertical align with:

NATIONAL MISSIONS

- National Health Mission
- Integrated Disease Surveillance Project (IDSP)

SUSTAINABLE DEVELOPMENT GOALS

03 GOOD HEALTH & WELL-BEING

09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

17 PARTNERSHIPS FORTHE GOALS

Objectives

- Build synergistic collaborations to aid systematic collection, analysis, and interpretation of public health data, and policy making
- Work with the local government to understand their health and disease priorities and build prevention and mitigation strategies
- Creating awareness on public health management and innovation amongst citizens via talks by experts

Highlights

- **Funds raised for COVID-19 projects**
  - INR 5.25 CR
  - Facilitated raising of INR 3.68 CR for partner institutions

- **Strong scientific support created for the local government during the pandemic**
  - Creation of a COVID-19 dashboard for Pune city
  - Sero-surveys in high disease-incidence wards

- **Significant contribution to COVID-19 testing in the country; PKC facilitated the sequencing of**
  - 2% of all the positive samples from Pune
  - 6% of all the samples submitted to INSACOG

- **Enabled scientific research in COVID-19**
  - Scientific Publications : 6

Activities

- COVID-19 Data Analysis and Forecasting for Pune City
- COVID-19 Sero-Survey
- COVID-19 Disease Surveillance (Genomic and Environmental)
- COVID-19 Long-Term Immunogenicity Study
- COVID-19 Epidemiological and Clinical Database for Pune
- Development of an Early Warning System for Infectious Diseases

COVID-19 Data Analysis and Forecasting - Pune City

During early stages of the pandemic, the Indian Government and the Indian Council of Medical Research (ICMR) constituted guidelines for centralized collection of demographic and clinical data such as total case count, mortality, hospital occupancy as well as guidelines for clinical management. Pune city managed by Pune Municipal Corporation (PMC), successfully initiated and maintained the Government mandated norms for data compilation from clinics and hospitals.

PMC and PKC entered into a collaborative agreement in April 2020 to develop and implement local policies based on the analysis of COVID-19 patient data.

PKC's role in the collaboration (Fig. 2):

- Curation of data
- Analysis of data at the sub-region level (Prabhags)
- Modelling of the data to project the pandemic curve
- Constitution of a project to assess the prevalence of positive serology among the population and coordination for resource procurements and allocation

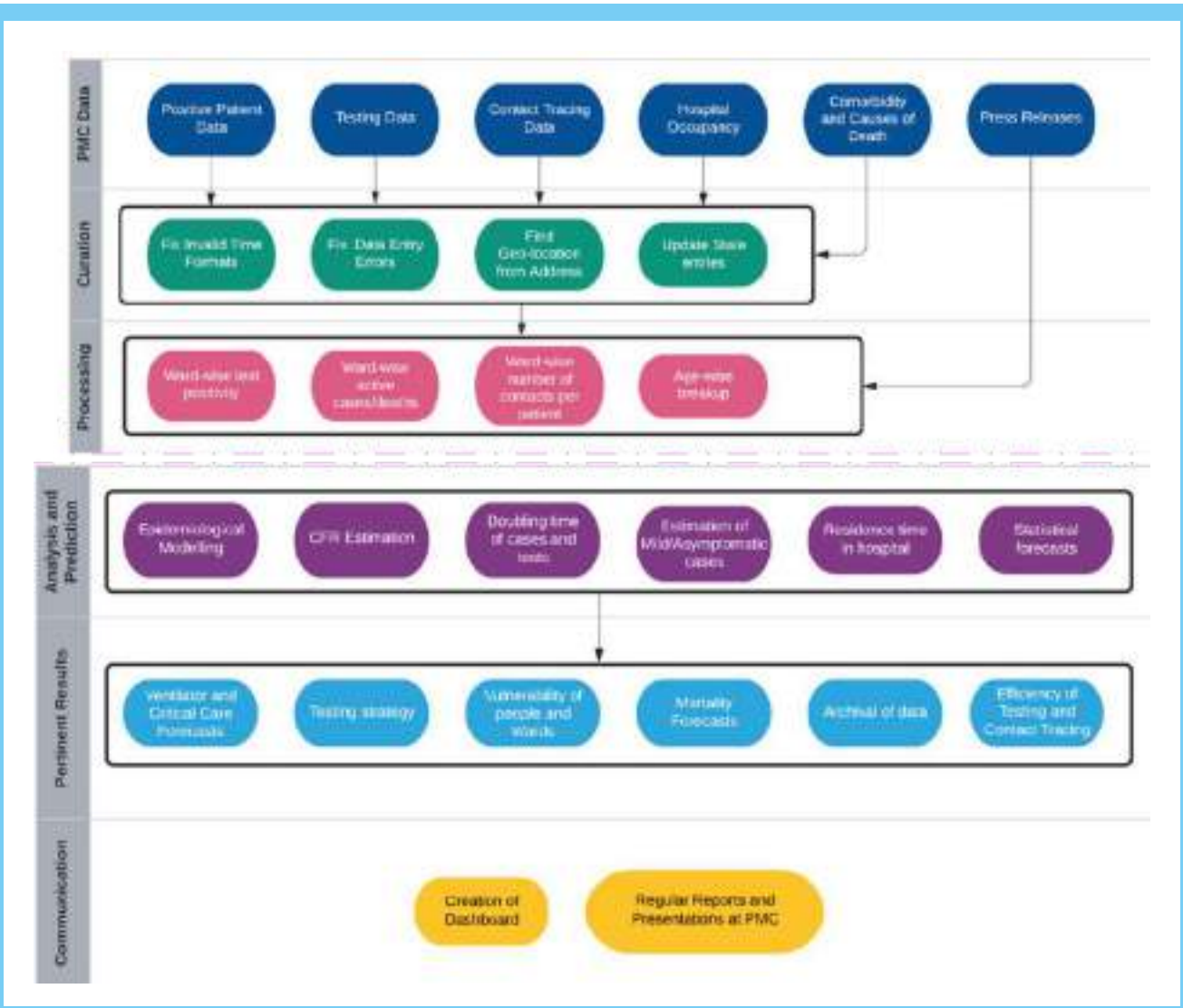

Fig. 2: COVID-19 activities undertaken by PKC in collaboration with Pune Municipal Corporation

Impact

- A publicly available dashboard was developed to forecast the incidence of COVID-19 in Pune. This was developed on the incidence of COVID-19 cases over time, case doubling time and trajectory at the city levels and sub-region levels
- The epidemiology and impact of lockdowns on the incidence of COVID-19 cases was assessed
- Accurate forecasting of the incidence of COVID-19 was done by experts associated with PKC. This enabled timely procurement of SARS-CoV-2 test kits, ventilators, and the establishment of additional test facilities, flu clinics and COVID-19 care centers
- COVID-19 hotspot pockets with high population density were identified. These areas were contained to limit transmission

COVID-19: Sero - Survey

A large proportion of SARS-CoV-2 infections remain asymptomatic and undetected unless screened for antibodies against the virus. Serological testing of a representative sample population is essential to estimate cumulative incidence of disease in the community. Sero-prevalence of antibodies against SARS-CoV-2 in five high-incidence Prabhags (subwards) of Pune was assessed to gain insights into the spread of the pandemic in the city. The study recruited 1664 individuals in 5 selected Prabhags (20th July - 5th August 2020).

Sponsor:
Persistent Foundation, Pune

PKC's role in the project:
- Putting together a consortium to implement the project
- Enabling fundraising, obtaining permissions from PMC and dissemination of data

Partners:
- Indian Institutes of Science Education and Research (IISER), Pune
- Savitribai Phule Pune University
- Pune Municipal Corporation (A key partner and stakeholder for this study. Data generated from the study has been submitted to PMC)
- Christian Medical College, Vellore
- Translational Health Science and Technology Institute (THSTI), Faridabad

Impact:
- The sero-surveillance dissected statistical profiling of Pune prabhags and indicated that there has been an extensive spread of infection in these Prabhags. 51.5% (CI: 49.1-53.9%) seroprevalence was reported in the five high-incidence Pune city Prabhags sampled.

- Based on the sero-survey, local officials were alerted about the imminent heavy load on the public health care system of the concerned Prabhags. Consequently, the city administration proactively increased testing and surveillance in these Prabhags.

Publications:
- Community prevalence of antibodies to SARS - CoV-2 and correlates of protective immunity in an Indian metropolitan city. *Aurnab Ghose, Sankar Bhattacharya, Arun S. Karthikeyan, Abhay Kudale, Joy M. Monteiro, Aparna Joshi, Guruprasad Medigeshi, Gagandeep Kang, Vineeta Bal, Satyajit Rath, L. S. Shashidhara, Jacob John, Susmita Chaudhuri, Aarti Nagarkar*; medRxiv 2020.11.17.20228155; doi: https://doi.org/10.1101/2020.11.17.20228155

- Into the thirteenth Month: A Case Study on the Outbreak Analytics and Modeling the spread of SARS-CoV-2 Infection in Pune City, India. *Joy Monteiro, Bhalchandra Pujari, Sarika Maitra Bhattacharrya, Anu Raghunathan, Ashwini Keskar, Arsh Shaikh, Prasad Bogam, Shweta Kadu, Nikita Raut, Devendra Vavale, Rupa Mishra, Ajit Kembhavi, L. S. Shashidhara, Vidya Mave;* medRxiv 2021.06.22.21259295; doi: https://doi.org/10.1101/2021.06.22.21259295

COVID-19: Disease Surveillance & Genomic Sequencing

During the pandemic, a national-level consortium called The Indian SARS-CoV-2 Genomics Consortium (INSACOG) was created jointly by The Union Health Ministry, The Department of Biotechnology (DBT), The Council for Scientific & Industrial Research (CSIR) and The Indian Council of Medical Research (ICMR). The consortium consists of premier academic institutes, research institutes, philanthropic groups and industry organizations came together to conduct nationwide genomic sequencing and bioinformatics - based research.

PKC is a part of this consortium and has helped synergize a multi-stakeholder collaboration in Pune (Fig 3) to upscale genomic surveillance by ramping up sequencing efforts and bio-informatics. Genomic sampling strategy was based on epidemiological data and clinical meta-data. PKC facilitated prospective, clinical, and retrospective sequencing of samples with a focus on vaccine breakthroughs and reinfection cases. Experts correlated the epidemiological dynamics and clinical outcomes of patients and aided in the implementation of appropriate public health and medical counter measures. Environmental Surveillance focused on the collection and analysis of sewage and wastewater samples from various parts of the city to complement human surveillance and enable early detection of disease, considering that a large proportion of infected people are asymptomatic.

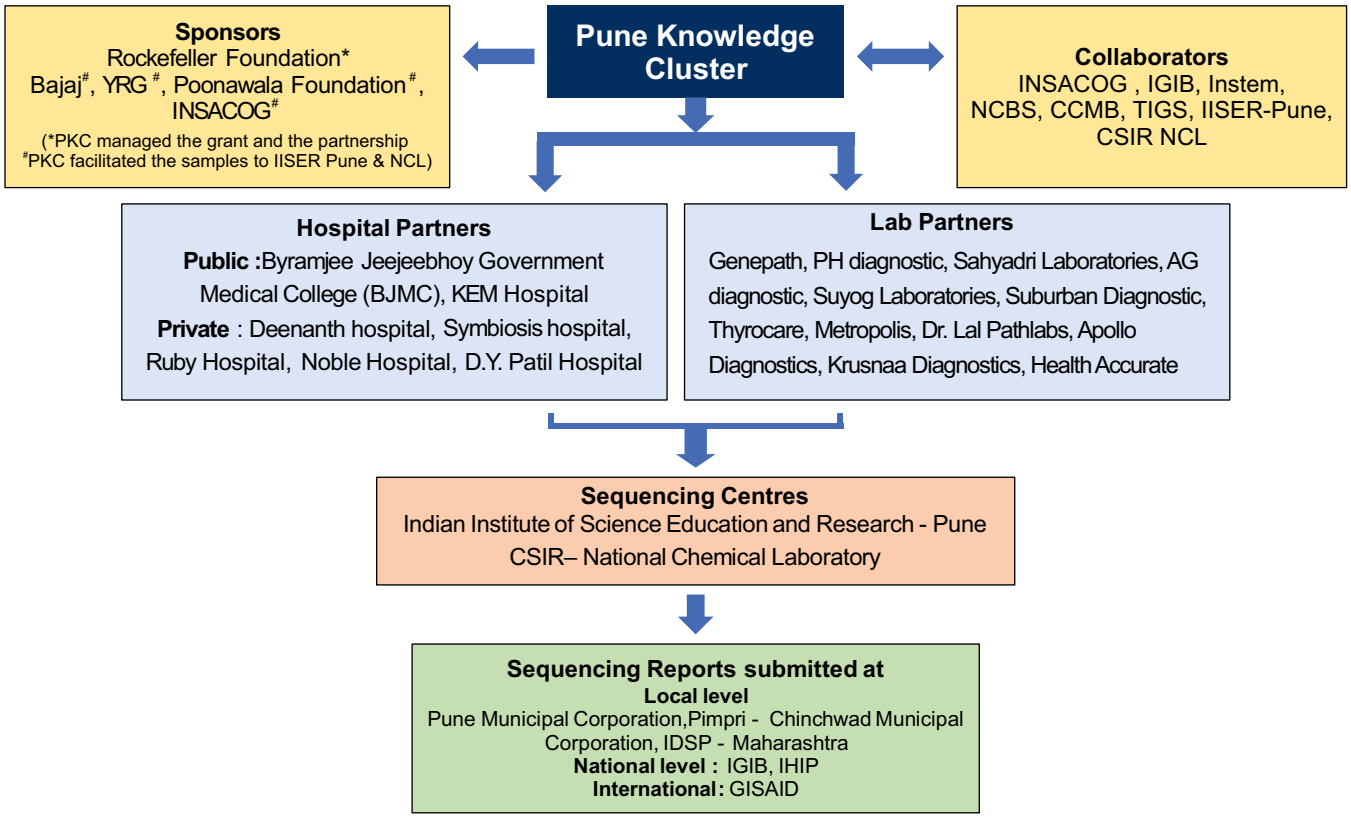

Fig. 3: Information and sample flow (Environmental surveillance & Clinical Sample Variant surveillance)

Sponsor:

- Rockefeller Foundation

Impact:

The project contributed significantly to COVID-19 sequencing efforts in India (Fig. 4). Through the project, 2% of all positive samples from Pune have been sequenced and 6% of all data submitted to INSACOG was facilitated by PKC.

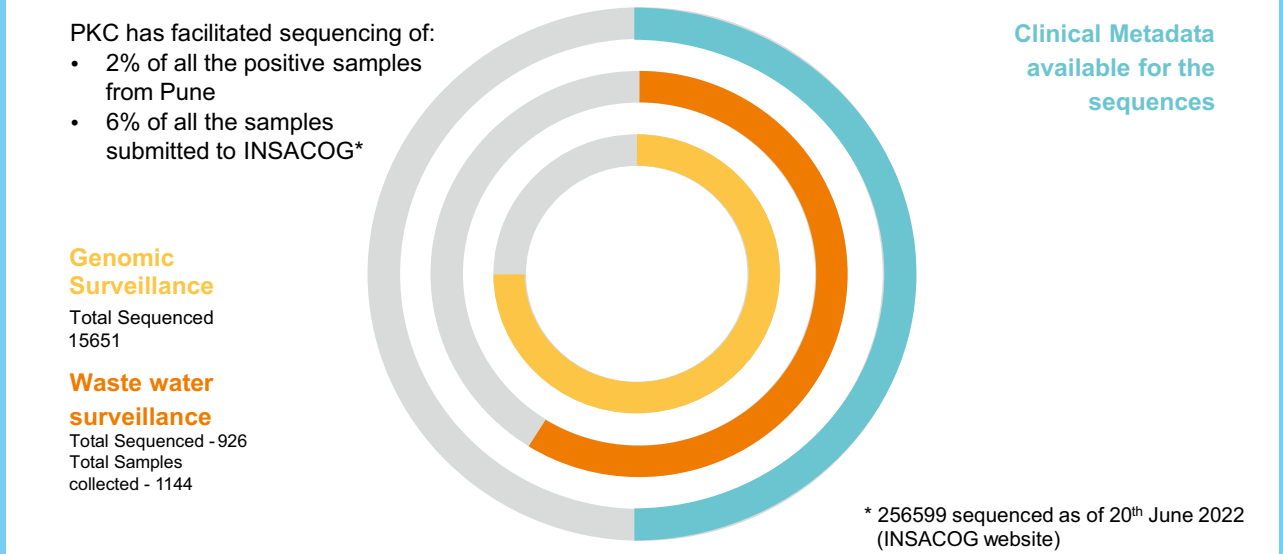

Fig. 4 : COVID-19 Surveillance (Genomic & Environmental) facilitated by PKC

PKC's role in the Project:
- Identification and selection of stakeholders
- Sample acquisition and sampling strategy
- Standardization of sample collection procedures
- Building and maintenance of data depository
- Dissemination of results to relevant stake-holders
- Fund Management and People Management

Project Status : Ongoing

Reporting of data:
- Weekly reports submitted to PMC
- Data was also shared with Pune Platform for COVID-19 Response (PPCR) and other key stakeholders to enable city level decisions
- Sequences shared on International and National databases for analysis

Publications:

- Mave, V., Shaikh, A., Monteiro, J. M. et al. Association of national and regional lockdowns with COVID-19 infection rates in Pune, India. Sci Rep 12, 10446 (2022). https://doi.org/10.1038/s41598-022-14674-0
- Bogam P, Joshi A, Nagarkar S, Jain D, Gupte N, Shashidhara L. S., Monteiro JM, Mave. VBurden of COVID-19 and case fatality rate in Pune, India: an analysis of the first and second wave of the pandemic. IJID Reg. 2022 Mar;2:74-81, Epub 2021 PMID: 35721428; PMCID: PMC8690685 https://doi.org/10.1016/j.ijregi.2021.12.006
- Dharmadhikari, T., Yadav, R., Dastager, S. et al. Translating SARS-CoV-2 wastewater-based epidemiology for prioritizing mass vaccination: A Strategic Overview. Environ. Sci. Pollut. Res. 28, 42975–42980 (2021). https://doi.org/10.1007/s11356-021-15169-7
- Dharmadhikari, Tanmay, et al. High throughput sequencing based direct detection of SARS-CoV-2 fragments in wastewater of Pune, West India. Science of The Total Environment 807 (2022): 151038. https://doi.org/10.1016/j.scitotenv.2021.151038

COVID-19: Long-Term Immunogenicity Study

The kinetics and longevity of immune responses generated by COVID-19 vaccines in the Indian population are not completely understood. To bridge this knowledge gap, a research study for multi-dimensional understanding of immune responses to SARS-CoV-2 was conducted in two cities including Pune (Fig. 5). The primary objective of the study was to understand differences in magnitude and longevity of humoral and cellular immune responses generated after vaccination with Indian vaccines for COVID-19 in individuals with or without evidence of prior SARS-CoV-2 infection based on sero-positivity.

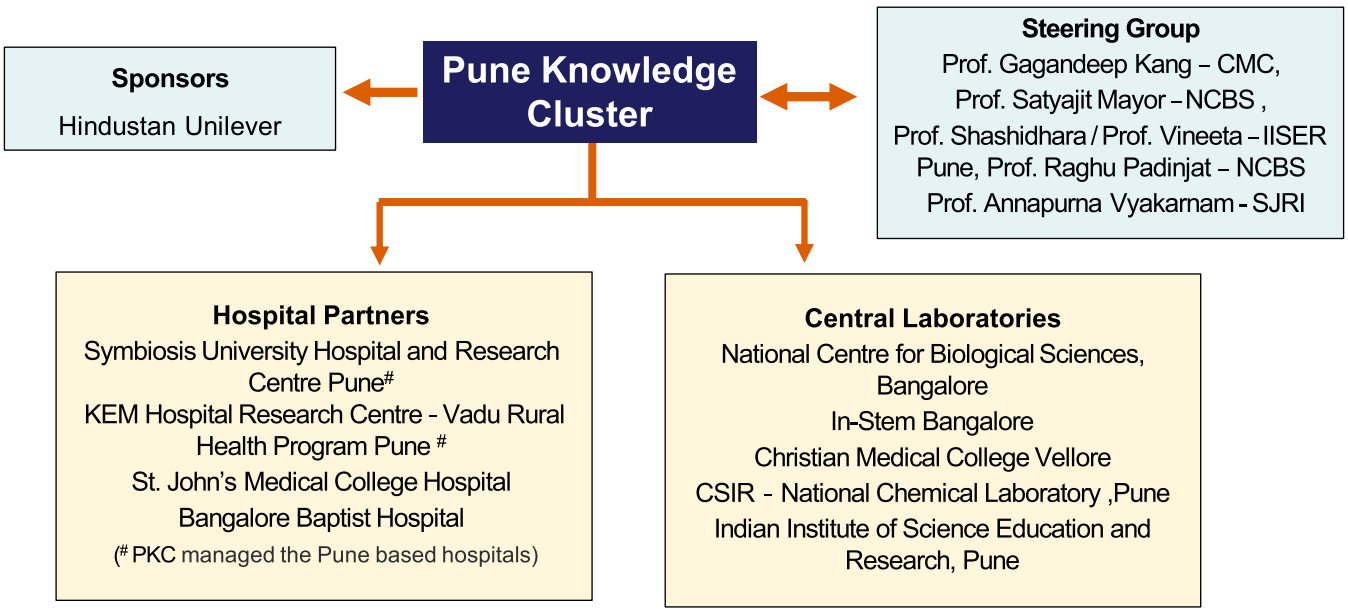

Fig. 5: Organizations Involved in the COVID-19 Long-Term Immunogenicity Study

Sponsor:
- Hindustan Unilever Ltd.

PKC's role in the Project:
- Identification and selection of stakeholders
- Development of Electronic Case Report Forms (eCRFs), and Standard Operating Procedures (SOPs) for sample collection and clinical investigations
- Fund Management and People Management
- Working and liaising with trial sites and laboratories

Impact:
- More than 300 individuals from Pune city participated in the COVID-19 Long Term Immunogenicity Study over a 9-month period
- Insights were generated for the role of innate immunity, microbiome, and micronutrient biomarkers on the immune response to the COVID-19 vaccine in the Indian subpopulation (Manuscripts under preparation)

Project Status: Phase 1 Completed; Study has been extended

COVID-19 Epidemiological And Clinical Database

PKC has used a data driven approach to understanding and implementing measures for COVID-19. Over the past 2 years, PKC in collaboration with hospitals, research organizations and civic bodies in Pune has collected and curated data for COVID-19 at various levels (Fig. 6). This includes data for disease prevalence, hospitalized patients, testing and mortality (Fig. 7). PKC is working to build comprehensive open source databases consisting of epidemiological, clinical and genomic data for COVID-19 which can be used by researchers and civic authorities to build city level models for understanding disease impact and progression (Fig. 8).

Project Status : Planning phase

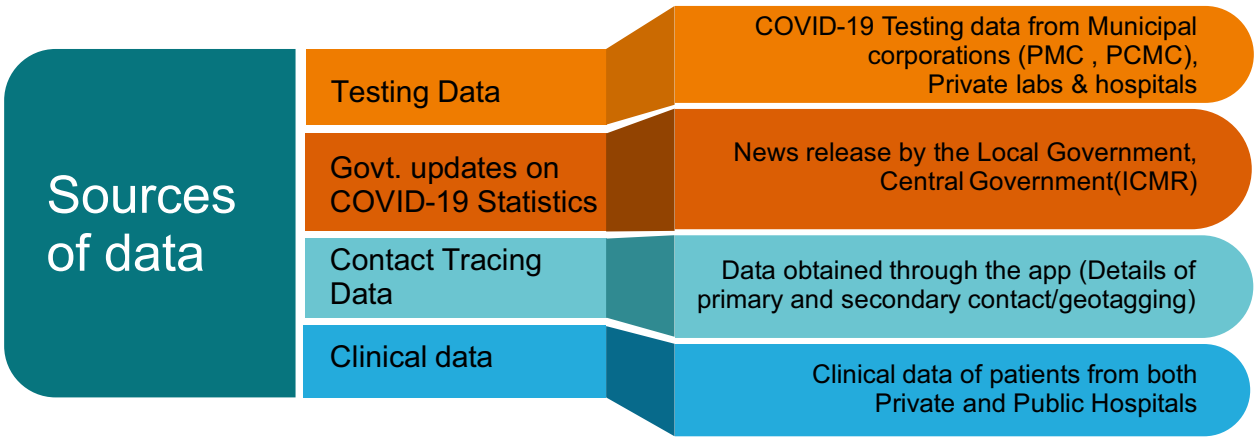

Fig. 6: Sources of COVID-19 Data Collected by PKC

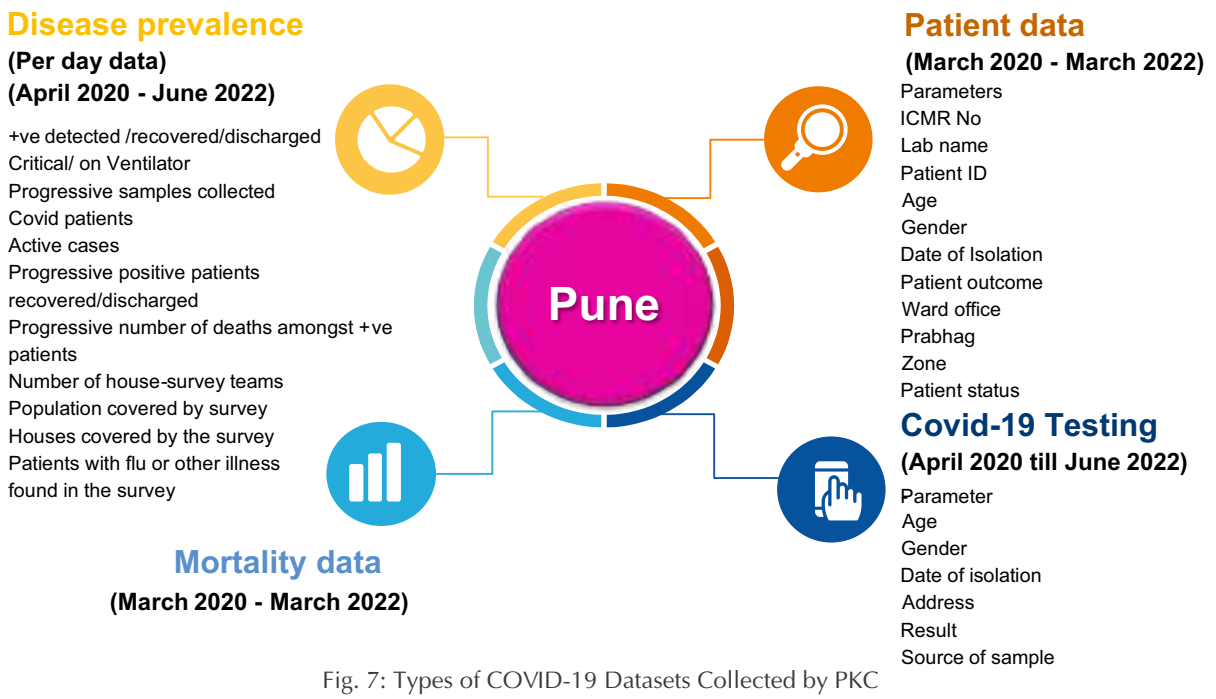

Fig. 7: Types of COVID-19 Datasets Collected by PKC

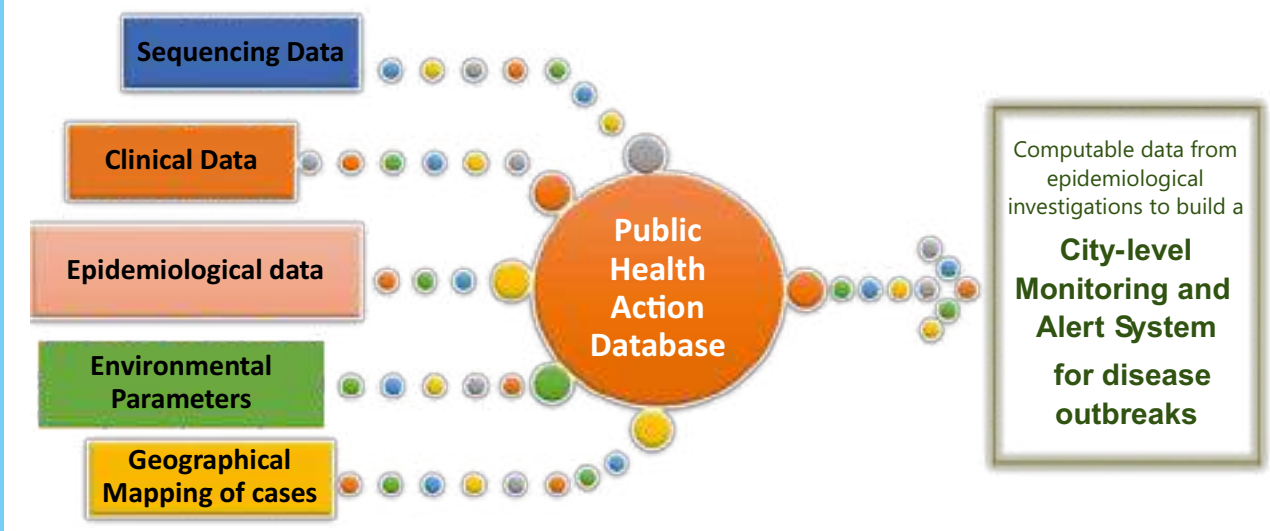

Fig. 8: COVID-19 Public Health Action Database for Pune Envisioned by PKC

Projects in pipeline

Development of an early warning system for infectious diseases: PKC plans to build an integrated surveillance system for Dengue and Anti-Microbial Resistance (AMR). The system will include channels for information flow between clinical and administrative partners to allow for timely prediction of disease risk and spread in communities.

Partners

Funding Partners

Program Partners

IMPACT REPORT | 2020-22

Sustainability and Environment

Projects of this vertical align with:

NATIONAL MISSIONS

- National Mission on Strategic Knowledge for Climate Change
- National Mission for a Green India
- National Biodiversity Mission
- National Mission on Sustainable Habitat
- National Water Mission
- National Jal Jeevan Mission

SUSTAINABLE DEVELOPMENT GOALS

"Just as our vision behind Agenda 2030 is lofty, our goals are comprehensive. It gives priority to the problems that have endured through the past decades and, it reflects our evolving understanding of the social, economic and environmental linkages that define our lives……

The sustainable development of one-sixth of humanity will be of great consequence to the world and our beautiful planet."

Shri. Narendra Modi, Prime Minister of India
- At the UN Sustainable Development Summit (2015)

With a core emphasis on sustainability and climate action, the Pune Knowledge Cluster supports India's commitment to the 2030 Agenda. The activities of PKC's Sustainability and Environment vertical particularly aligns with the SDGs 6, 7, 8, 11, 13, 15, 17.

Objectives

- Improving vegetation cover in Pune and surrounding regions to contribute to the national objective of additional natural carbon sinks while meeting local socio - economic and environmental needs through afforestation and habitat improvement measures
- Understanding regional environmental problems, developing policies for efficient use of resources, and facilitating the implementation of solutions via collaboration between various stakeholders - civic bodies, citizens, NGOs and corporate sponsors
- Working towards climate-proofing of the Pune Metropolitan Region by securing water, food & livelihood through programs focused on multi-dimensional sustainability

Highlights

- **Funds raised for programs : INR 23 Lakhs**
- **Number of policy documents under development : 2**
- **Number of Digital platforms and tools for Environmental Monitoring developed/ under development : 2**
- **Number of citizen engagement events conducted : 8**

Activities

- Programs for Sustainable Increase of Vegetation Cover
- Monitoring and Evaluation of Environmental Programs
- Policy Advocacy

PROGRAMS FOR SUSTAINABLE INCREASE OF VEGETATION COVER

Pune Knowledge Cluster is working towards enhancing the carbon sinks on both public and private land by facilitating plantation activities in urban, peri-urban and rural areas (Fig. 1). As a knowledge partner, PKC helps in the incorporation of aspects of multi-dimensional sustainability at the social, economic, and ecological levels in plantation and afforestation activities.

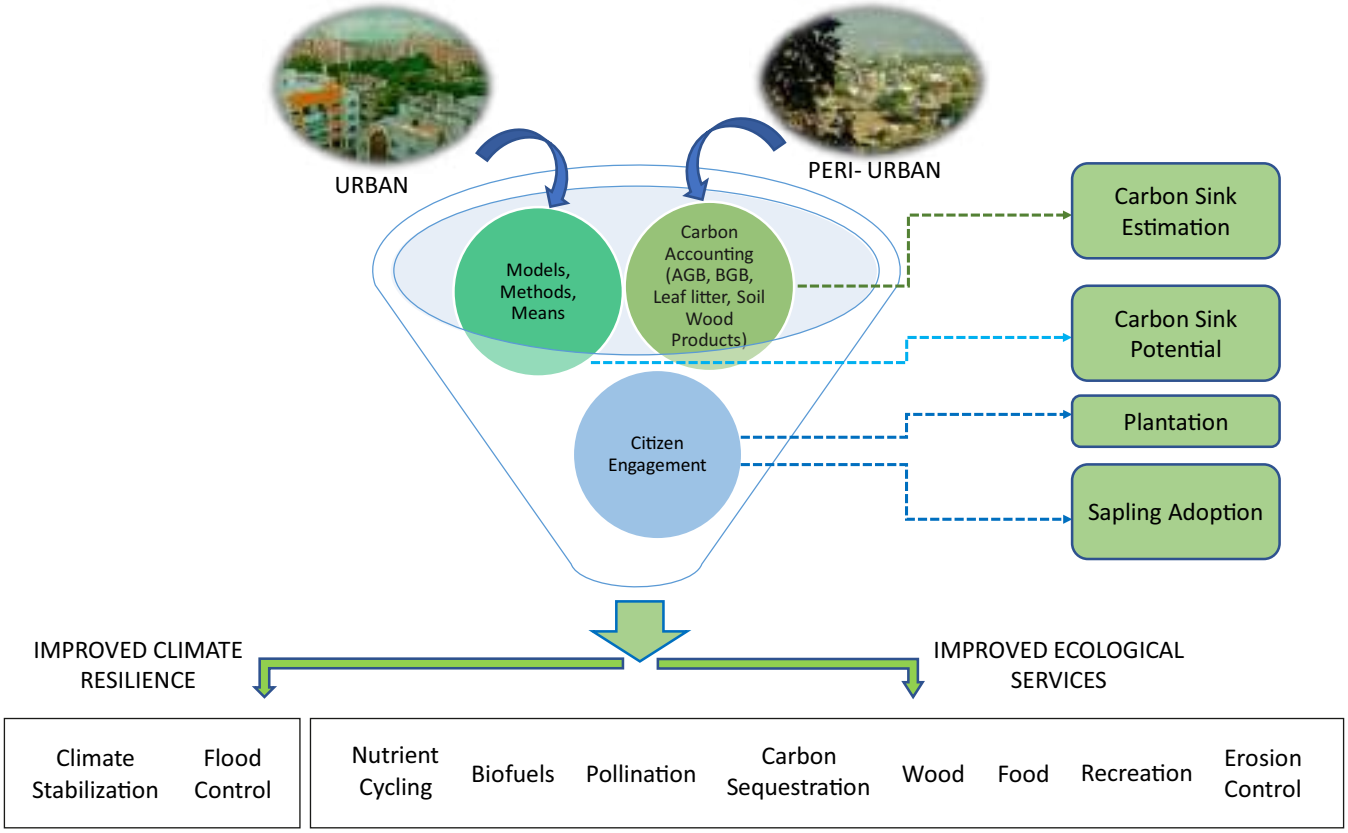

Fig. 1 : PKC's approach toward the sustainable increase of vegetation cover

PKC's Role as a Knowledge Partner in Sustainable Increase of Vegetation Cover:

Defining Objectives for Plantation

- PKC helps stakeholders to define objectives of afforestation such as Carbon Sequestration, Greening, Biomass Production, Food Forest & Fodder, Medicinal Plants, Argo-forestry, Disaster Risk Management, Soil Enrichment and Biodiversity Parks

Conducting Pre-Plantation Studies

- Status study of 5 pillars of the plantation - Water, Land, Forest, Animals and Humans
- Plantation site identification
- Sustainability Plan - Ecological, Social, Economical
- Integrated learnings from natural forests
- Water conservation action plan
- Soil conservation action plan
- Species selection, composition and density based on inter-intra species interactions

Building of Technology based Monitoring and Reporting Tools
- Estimation of carbon sink potential pre-plantation
- Platform to adopt, monitor and track planted saplings through citizen engagement
- Automated, scalable platform for tree census using satellite imagery and drone based LiDAR

Conducting Training and Skilling Programs for Sustainable Socio-Economic Development
- Courses on nursery development
- Awareness program on scientific methods of plantation
- Introductory and advanced courses on Environmental, Social & Governance (ESG)

Forestry Programs

Piloting Sustainable Large Scale Afforestation on degraded lands:
While, PKC's projects have a strong focus on protecting the environment (including biodiversity) and addressing climate change, the ideas are centred around food, water and livelihood security in the backdrop of opportunities for economic growth. Towards this objective we design our projects to meet multiple objectives including sustainable production of raw materials for meeting industry requirements such as biomass for biofuel industry (short-term), soft wood for paper and plywood industry (medium term) and hard-wood for furniture and construction industry (long-term).

PKC aims to develop socially, financially, and environmentally sustainable Biodiversity Parks on degraded public and private forest lands. Sites identified are Loni-Kalbhor (outskirts of Pune) and Medhankarwadi, Chakan, Maharashtra (industrial area in the Western ghats known as a biodiversity hotspot).

Planned activities
- Develop an Integrated Conservation and Management Plan for the area
- Watershed activities, soil preparation, and irrigation-related activities
- Plantation activities along with its maintenance and temporary supporting infrastructure such as storage, roads and fencing and supplementary livelihood activities such as pisciculture, apiculture and tourism
- To make the forest self-sustainable, plantation models based on inter and intra-species interactions will be developed to increase yields of timber, wood for the paper and plywood industry, NTFPs and biomass for bio-fuels to supplement domestic and agri-waste
- Development of a buffer zone along the forest boundaries to check encroachments and grazing by livestock

Intended Impact
- Green House Gas (GHG) sequestration of 10-20 tonnes CO_2 per ha per annum
- Increment in tree density up to 1000 trees per ha. on 900 ha to increase richness and abundance of flora and fauna respectively
- Employment to laborers through tourism, NTFP (biomass and other products), and management activities
- Revenue through sale of NTFPs, tourism, biomass (biofuels), apiculture and pisciculture
- Supplementing Bio-CNG plants with biomass from the forests shall improve farmer's income by INR 2,000/- p.ton from dry agri wastes and saving of waste disposal costs namely INR 2,000/- per ton of wet domestic wastes per day for gram panchayat
- Reduced emissions through 5 tonnes of Bio-CNG about 1 million tCO_2 eq. per annum

GreenWeb - Urban Forestry Program

Pune Knowledge Cluster works on various initiatives to promote and sustain urban forestry. The objectives of GreenWeb Urban Forestry Program include:

- Promoting urban forestry with particular emphasis on the plantation of native and ecologically suitable species
- Public engagement through plantation drives and nature walks
- Developing an easy-to-use IT platform for tracking & monitoring sapling health through citizen engagement
- Facilitating interaction between civic bodies, citizens, and sponsors to create sustainable greenery in the city

Sponsor:

- Cummins Foundation
- Schlumberger

Intended Impact

- To increase survival rates of sapling plantations in the city using a data and technology driven approach
- Improved conservation efforts through public participation & scientific knowledge

Green Web Programs:

- ConnecTree
- TreeVerse
- Carbon Neutral Campus

ConnecTree

ConnecTree is an AI-enabled interactive platform for choosing, promoting, tracking, and maintaining sapling plantations by citizens, sponsors and local government bodies. Through this platform, PKC in collaboration with NGOs facilitates plantation drives and nature walks to increase awareness about the importance of ecological conservation amongst citizens and sponsors (Fig. 2, and Fig. 3).

Status

- No. of saplings brought under ConnecTree: 200
- No. of saplings sponsored: 11
- NGO Caregivers: 3 (CEE India, Environment Conservation Association, Paryavaran Gatividhi)
- Survival rate of sponsored saplings: 70%

Fig. 2: PKC team members and Officials of Pune Municipal Corporation & Pune Smart city participating in Adopt a sapling program.

Fig. 3 : Volunteer collecting sapling health data using ConnecTree platform

Monitoring and Evaluation of Environmental Programs

TreeVerse

A computational model for carbon sink estimation which can enable city authorities/ administrators for planning initiatives for carbon neutrality.

TreeVerse program is an AI-based automated tree demography model that provides a tech - based platform to carry out ecological studies on urban plantations. It will also contribute, in part, to the nation's commitment to the enhanced transparency framework that provides information on the implementation and achievement of national objectives as part of the nationally determined contributions (NDCs) in the Paris Agreement.

Activities

- Carbon Accounting
  a. Geo-spatial data mining to estimate and characterize the tree cover of a region
  b. Calculating current Carbon potential using current tree census
- Estimating Carbon Sink Potential
  a. Tree - growth modelling & predicting carbon sequestration

Intended Impact

- Estimation of required carbon sink capacity in 2030/ 2035 for Pune Municipal Corporation
- Development of a tool for Urban Planners and Industries to plan and implement their carbon sequestration efforts
- Improved biodiversity & habitats through data-driven conservation strategies
- Identification of additional greening capacity

Fig. 4 : Trees tagged at IISER Pune Campus

Progress

- Preliminary estimate of Carbon sink for Pune City calculated
- Tree statistics for growth modeling within PMC:
  - Species tagged: 32
  - Trees tagged: 1,018
  - No. of sites [Public Gardens, Institutional Campuses (Fig. 4)] tagged : 24

Carbon Neutral Campus Initiative

PKC is working with Samuchit Enviro Tech, a member of the Indian Network on Ethics and Climate Change (INECC) as well as Climate Collective Pune (CCP) on a collaborative project called The 'Carbon Neutral Campus Initiative (CNC) - which aims to trigger climate change discussion and climate action in educational and institutional campuses. The overarching objective of CNC is to motivate and mentor administrations of educational institutes to go low carbon (preferably carbon neutral) on their campuses.

Activities

Under this project, carbon accounting for campuses is performed by estimating their carbon emissions (eg. fossil fuel consumption, electricity consumption) and the carbon sequestration capacity coming from the green cover (trees). Based on these calculations, recommendations are made by experts for possible new technologies, services, structural and procedural changes that may be undertaken to further reduce carbon emissions and/or increase carbon sequestration through sinks and offsets on and off the campuses.

Progress

Carbon accounting for two educational institutions has been completed (Fig. 5), and the report has been submitted to the institute administration. The work has been accepted as an abstract in the in the 8th IEEE International Smart Cities Conference (ISC2 2022) - "Community Smartification and towards ZERO emission Smart Cities for a Green New Era", to be held at Paphos, Cyprus from 26-29 September 2022.

Publications:

- Animesh Mehta, Gayatri Doctor, Anita Kane, Disha Sawant, "Study for achieving carbon-neutral campus in India," 2022 IEEE International Smart Cities Conference (ISC2), 2022, pp. 1-4, doi: 10.1109/ISC255366.2022.992222

Fig. 5 : Carbon sink accounting for a campus done as part of the Carbon Neutral Campus Initiative

POLICY ADVOCACY

PKC works with in-house experts and external agencies to create vision documents and action plans to enable development of sustainable solutions for environmental problems.

Key initiatives include:
- Sustainable Water Action Plan for Pune Metropolitan Region
- National Biomass Policy Document

Sustainable Water Action Plan for PMR

Government of Maharashtra notified an Integrated State Water Plan (ISWP) for five major rivers namely Narmada, Godavari, Krishna, Tapi and Mahanadi and also the West flowing rivers. The Water Plan is developed using geomorphology-based landscape approach defined by rivers, sub-rivers, watershed and micro-watersheds. The PKC-facilitated participatory Sustainable Water Action Plan (SWAP) for Pune Metropolitan Region pilots the ISWP approach. The SWAP aims to underpin the ISWP by converging the efforts and resources of all stakeholders towards "water security". The idea of the SWAP is to create water observatories for collecting, collating and analyzing data related to water availability, usage, discharge including sewage and effluents, land-use changes, climate and schemes/programs/policies of the government. The other outcomes of SWAP will a decision support system for all stakeholders especially the government and industries.

Key Beneficiaries of SWAP:

- **Administrators & Policy Makers:**

It would act as a decision support system where all information regarding water (availability, use, discharge), land use (with land use change), human habitation, economic activities, climate change vulnerability, etc. will be available at both macro and micro levels. The tools and systems can be used by decision makers to plan, synergize and deploy resources more efficiently.

- **Industries:**

It will help the private sector (existing and upcoming industries) understand their socio - economic - environmental impact at macro and micro level. The private sector would benefit through the knowledge of availability/limitations of resources and can help in maximizing and securing returns on investments.

- **Research and Education Institutions:**

Knowledge of river basin problems and availability of data to address the problems can help academic and research institutions to undertake pointed research and education activities, and develop implementable technologies.

- **Civil Society Organizations:**

Knowledge of ongoing schemes/ programs/ initiatives of public and private sector, and other organizations can help synergize efforts and maximize outputs.

- **Citizens:**

Knowledge of water availability can help in decision making and investment in housing and businesses with better potential for return.

Status :
An outline of the Pune Metropolitan Region divided into 11 river/ sub-river/ watersheds has been prepared using geomorphology based landscape approach (i.e., watershed, catchment, and zone of influence) (Fig. 6). The Action Plan will prescribe solutions to problems at macro-micro level.

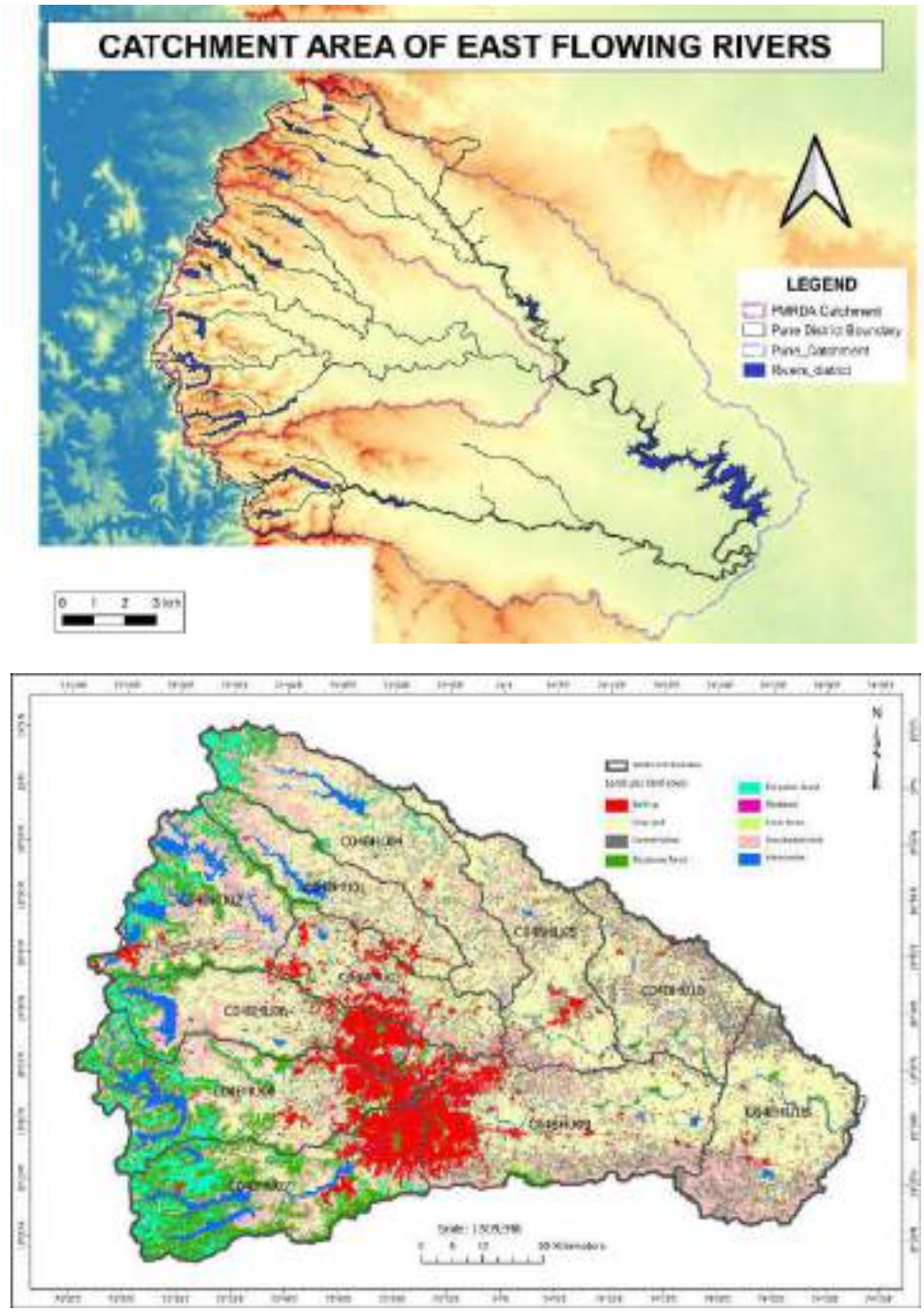

Fig. 6 Outline of the Pune Metropolitan Region based on a river basin approach (The area shown in the maps above, comprises PMC, PCMC, PMRDA, municipal councils, cantonments, towns and rural areas)

PKC is actively working as a knowledge partner with the local administration (Pune Municipal Corporation and Pune Zilla Parishad) for technology evaluation, project feasibility studies, and creating water conservation plans for water-stressed villages identified by the Pune Zilla Parishad. As a pilot PKC has chosen one water stressed village (Washere, Khed Teshil, Pune District - Fig. 7) to prepare a water action plan for increasing water availability and development of the village.

Fig. 7: Washere - Water stressed village (Khed Teshil, Pune District)

Development of a National Biomass Policy

PKC is preparing a National Biomass Policy that aims to increase biomass availability for biofuels, energy resources for power generation, agriculture (organic fertilizers), timber, nutrition, and micro-entrepreneurship. The policy will promote increasing biomass on uncultivated and degraded lands, both public (forests and village) and private (farms, industrial, and mines), watersheds and catchment areas of wetlands and rivers. This policy will not only lead to accelerated development and utilization of bio-fuels but many other objectives of the Government of India such as making India a 5 trillion economy, doubling farmers income, restoration of 26 million ha of degraded lands and to create an additional carbon sink of 2.5 – 3 tCO_2 eq.

Partners

Funding Partners

Cummins

Schlumberger

Program Partners

PUNE SMART CITY

MISSION GROUNDWATER

CEE
Centre for Environment Education

WRCS

Centre for Ecological Sciences, IISc

FLAME UNIVERSITY

GAIA
The Earth Foundation

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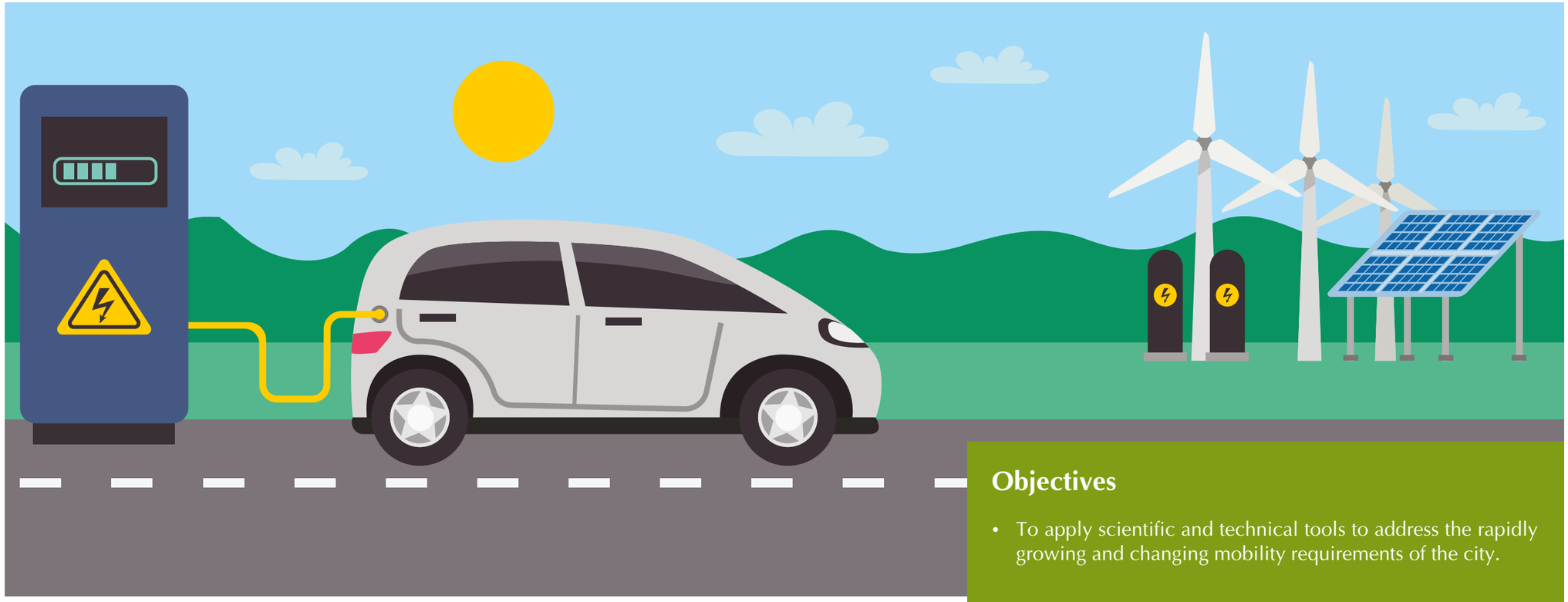
Sustainable Mobility



Objectives

- To apply scientific and technical tools to address the rapidly growing and changing mobility requirements of the city.
- To support the development of sustainable solutions for carbon - neutral transportation.

> "Conversion of India's vehicles to electrical vehicles has a potential to save fossil fuels worth about $100 bn annually, which in turn would save the country precious foreign exchange, prevent the dependence on imported petroleum products and reduce the pollution in cities by 80 - 90%."
>
> **Shri. Piyush Goyal,**
> Union Minister of State (IC), Power, Coal, New & Renewable Energy & Mines,
> - At The World Conference on Environment 2017

According to 'India 2020 - Energy Policy Review', published by International Energy Agency (doi: 10.1787/9faa9816-en), the Indian transport sector accounts for 13.5% of the country's energy-related carbon dioxide emissions, with road transport accounting for 90% of the sector's final energy consumption. Other than greenhouse gases, the transport sector is also a major emitter of several toxic gases such as Nitrogen Oxides (NO), which cause local air pollution, resulting in the prevalence of adverse health effects and premature deaths, especially in urban areas. With growing needs of the population, it is crucial to adopt large scale measures for clean mobility. The Pune Knowledge Cluster in collaboration with local civic authorities, research institutions, and think tanks, is working towards promoting modes of sustainable mobility in the Pune metropolitan region.

Highlights

- A technical and financial analysis of EV potential for Pune city prepared as part of a commissioned study
- A brainstorming workshop for building vehicular E-waste recycling capacity conducted in which over 30 stakeholders including civic bodies, industries and research institutions in Pune participated

Activities

- Technical & Financial Analysis Of EV Potential In PMR
- Initiatives to promote Vehicular E-Waste Recycling

Projects of this vertical align with:

NATIONAL MISSIONS

- National Electric Vehicle Mission
- National Electric Mobility Mission Plan (NEMMP) 2020
- National Mission on Transformative Mobility and battery Storage
- Waste to Wealth Mission
- Smart City Mission

SUSTAINABLE DEVELOPMENT GOALS

Technical & Financial Analysis of EV Potential in PMR

- Through a study commissioned by The Pune International Center, PKC prepared a comprehensive report on technical and financial feasibility of electric vehicle potential in the Pune Metropolitan Region. The objective of this report was to provide an overview of key traffic routes and potential areas for installing EV charging stations and to calculate the potential and feasibility of Renewable Energy powered charging stations for EVs. The report is a part of a larger Action Plan for implementing Carbon Neutrality measures in PMR. This report includes the following:
  - Feasibility of converting Buses andTrucks to EVs and other low carbon technologies
  - Assessment of 2W, 3W, and 4W conversion potential to EVs in PMR
  - Assessment of the potential to integrate low-carbon public transportation in PMR

Initiatives to promote Vehicular E-Waste Recycling

PKC is conceptualizing projects with technology providers and the auto industry to pilot novel technologies for vehicle E-waste recycling at the city level through public-private partnership models.

Activities

- Identify feasible technologies for recovery of Lithium and precious metals in batteries, catalytic converters in a costeffective and safe manner
- Develop an E-waste Management Center (Demo Unit) to demonstrate technical and economical feasibility of novel technologies

Intended impact

The demonstrative unit will have capabilities for segregation, shredding, chemical processing and material recovery (Lithium, Cadmium and others) and piloted technologies will be available for commercial use.

Progress

Pune Knowledge Cluster and Automotive Research Association of India (ARAI) co-organized a workshop on “Developing Action Plan for Automotive E-Waste Management & Recycling” at ARAI Pune on 2 July 2022. Panel discussions were held on the challenges & possible solutions for E-waste Management in Pune city involving civic bodies, industries & research institutions. (Fig. 1).

Fig. 1: Workshop on “Developing an Action Plan for Automotive E-Waste Management & Recycling”, 02 July 2022 co-organized by PKC and ARAI Pune. Participants included - Members of Local civic bodies (Pune Municipal Corporation, Regional Transport Office, Pimpri-Chinchwad Municipal Corporation Pune Smart City Development Corporation Limited), Industries (Mercedes Benz India Pvt. Ltd., Mahindra CERO, Attero Recycling, Exigo Recycling, Delhi, Tata Chemicals, Eaton, Frost & Sullivan, Reteck Envirotech Pvt. Ltd., Exide Industries Limited, Second life Li-ion Batteries, Nunam, Badve Engineering Ltd., Green IT recycling, ANTAL International, Nile Limited) and Research Institutions (ARAI Pune, Physics Department Savitribai Phule Pune University, CSIR NCL, CMET, Hyderabad).

Partners

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Big Data and AI

> “India today is well-positioned to become a global leader in Artificial Intelligence (AI) and there is a need to adopt it across all sectors”.
>
> **Shri. Amitabh Kant**
> Ex - CEO, Niti Aayog

Big data and Artificial Intelligence are slowly percolating in technological aspects of all sectors be it healthcare, education, agriculture, transport, or infrastructure. The application of AI for societal good has the potential to accelerate the growth of the Nation by multiple folds.

Pune Knowledge Cluster is currently involved in leveraging the immense potential of Big data and AI in various fields such as Health, Education, and Climate action through several innovative programs

Objectives

- Facilitating open access to data - by developing state - of - the - art web - based platforms where scientists are provided with customized survey applications and citizens get access to scientific data sets (images/ plots/ handwritten documents) and a user interface to be able to analyze/ decode/ digitize data
- Increasing opportunities for interaction between the scientific community and the general public with a special emphasis on inclusivity via Citizen Science initiatives and public talks
- Promoting data science literacy via various capacity - building initiatives, industry - relevant training programs, and scholarship programs

Projects of this vertical align with:

NATIONAL MISSIONS

- National Mission for Artificial Intelligence
- National Supercomputing Mission
- National Mission on Education through Information and Communication Technology (NMEICT)

SUSTAINABLE DEVELOPMENT GOALS

Highlights

Crowd sourced data collection and analysis platforms developed for astronomy (Citizen Science)

- Completed and publicly accessible: 1
- Under development: 2
- Citizens enrolled: 1000+

Crowd sourced data collection and analysis platforms developed for urban forestry (Citizen Engagement)

- Completed and publicly accessible: 1
- Citizens enrolled: 100+

Activities

- Citizen Science Programs
- Development of Artificial Intelligence Consortium Biology and Chemistry
- Technologically enabling urban forestry efforts in Pune

Citizen Science Programs

Scientific advancement in any field often encounters issues like enormous data size, instrumentation, computational constraints, a limited number of trained researchers, etc. Artificial intelligence (AI) appears as a possible solution for dealing with gigantic datasets. However, AI can be efficiently employed, only if the preliminary requirement of a large number of training datasets and trained analysts is fulfilled. Here the power of crowdsourcing or citizen science can be utilized.

Citizen science is the practice of public participation and collaboration in scientific research. Through citizen science programs, the general public share and contribute to data collection, monitoring, and analysis. PKC aims to involve enthusiastic volunteers from the public to perform data analysis and build such training datasets.

ONGOING PROJECTS

One Million Galaxies

Images of the universe have the power to kindle curiosity in people from all walks of life. PKC's first citizen science project is based on image analyses of Galaxy images from a Japanese Telescope 'Subaru'. Astronomy enthusiasts from the public are trained by expert astronomers to identify nuanced features of the galaxy images and then provided with an intuitive user-interface to mark the peculiarities (Fig. 1). The project is developed under the guidance of Prof. Ajit Kembhavi and Prof. Sudhanshu Barway (Indian Institute of Astrophysics, Bangalore).

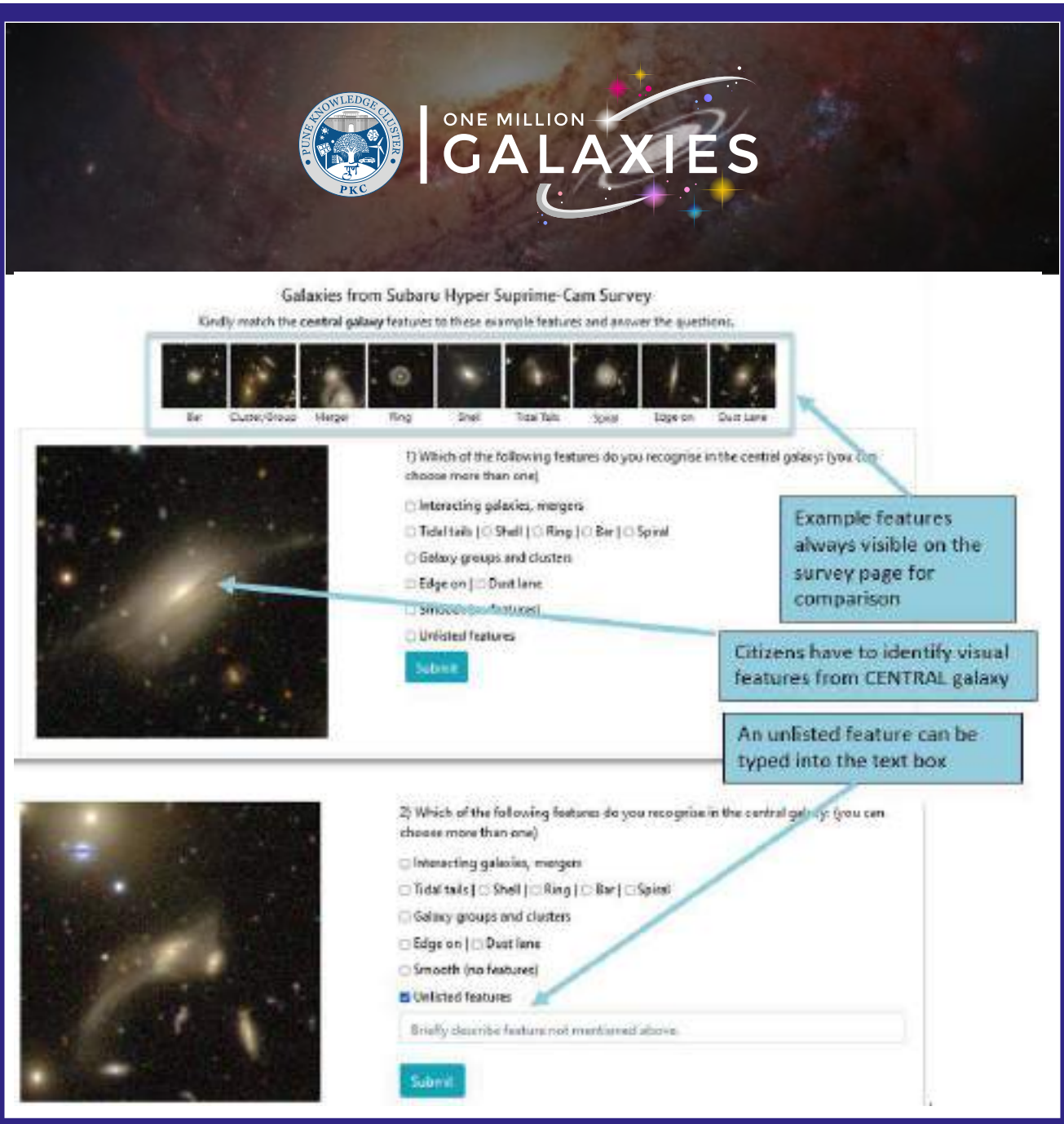


Fig. 1 User interface of One Million Galaxy Platform

Activities

- Amateur astronomy groups and planetariums were sensitized about the program and interested citizens were onboarded.
- A pilot platform was developed for the citizens, after beta testing of the platform by a group of amateur astronomers and science enthusiasts, the platform was launched for the general public on National Science Day, 28th February 2022 (Fig. 2) . The platform is accessible at https://csa.pkc.org.in/

One Million Galaxies platform is publicly available at: https://csa.pkc.org.in/

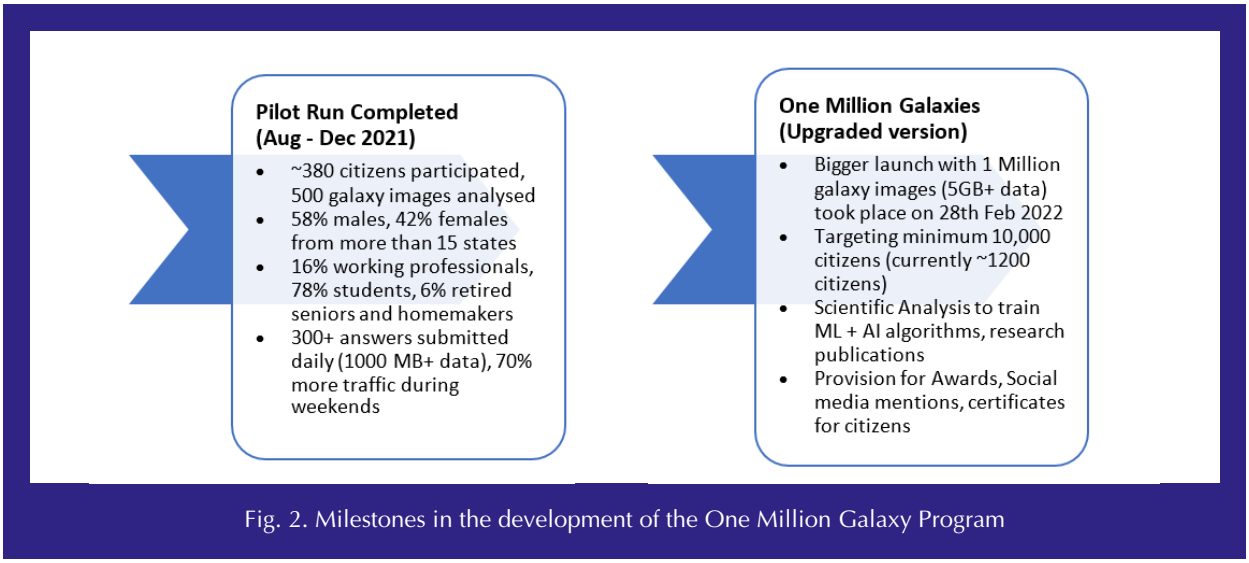
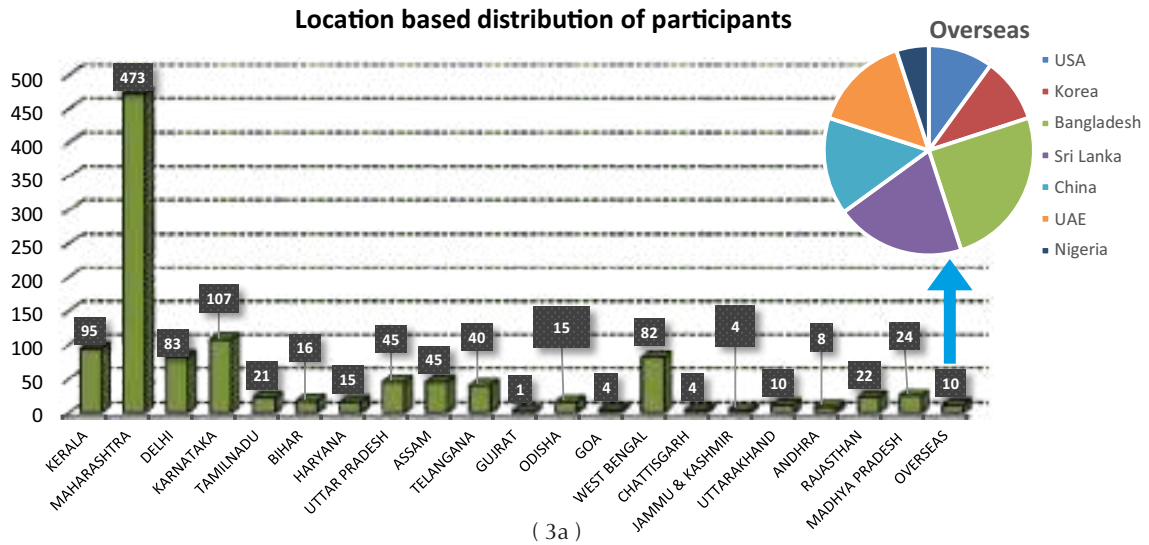


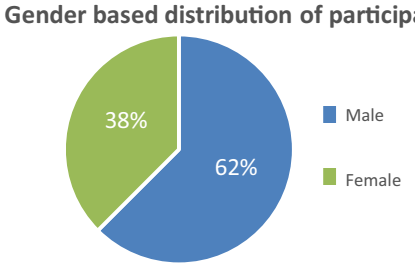
Fig. 2. Milestones in the development of the One Million Galaxy Program

Progress

- More than 1000 citizen-scientists have enrolled on the platform from India & overseas (Fig. 3 (3a, 3b)



(3a)



(3b)

Fig. 3 Demographics of citizens participating in the One Million Galaxies program

3a. Location-based distribution of participants
3b. Gender-based distribution of participants

- Around 80,000 features from galaxy images have been identified until the end of July 2022. (Fig. 4)

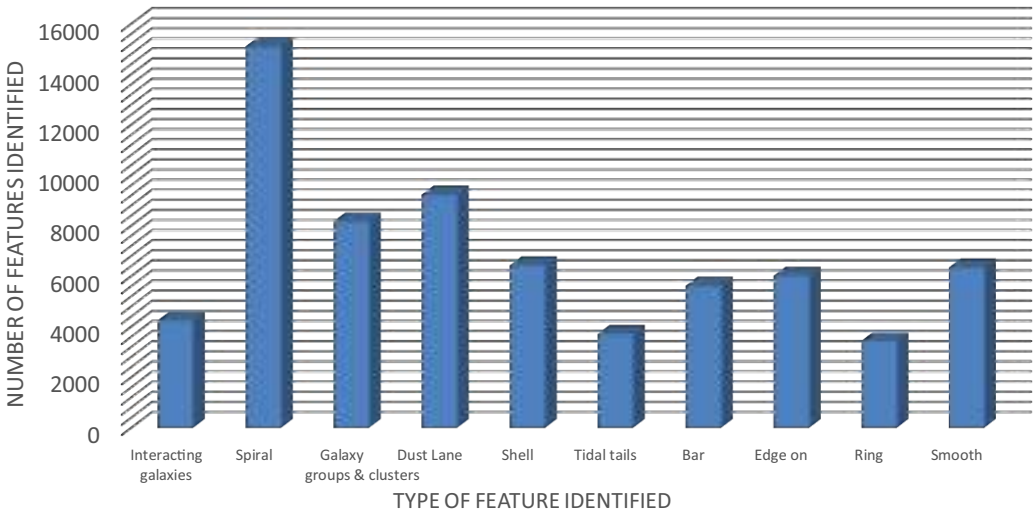


Fig. 4. Galaxy features identified using One Million Galaxies

Highlights

Various podiums where the program was invited to be presented:

- Workshop on "Brainstorming pandemic-era outreach methodologies in astronomy and related fields" organized by Indian Institute of Astrophysics, Bangalore on 2-3 August 2021
- State Level Amateur astronomer's meet organized by APJ Abdul Kalam Astro-space and Science Centre in Aurangabad on 7-8 May 2022

Acknowledgments

The team members have been acknowledged for their contributions:

- Dr. Disha Sawant was invited on the discussion panel for Multi-stakeholder Roundtable on Citizen Science Policy and Practices in India organized by DST - Centre for Policy Research - IISc, Bengaluru, 10 May 2022
- Atharva Bagul (IISER Bhopal), Research Assistant - One Million Galaxies won a "Citizen Science Fellowship" by EarthWatch India worth INR 1 Lakh

Projects in pipeline

1. Quest for Quasars

Moving beyond images and slightly towards complex kinds of datasets, we would like to explore variability in Quasars (Active Galactic Nuclei) by studying their spectral features. A pilot platform is being designed in collaboration with Prof. Vivek M. from Indian Institute of Astrophysics, Bangalore, This project will focus on two tiers of citizens.

- **Type I:** Identifying quasar type using simple layout, simple question: for the general public
- **Type II:** Exploring the detailed features in absorption, and emission by quasars by comparing their multi-epoch spectra: for students with experience in astronomy (Fig. 5)

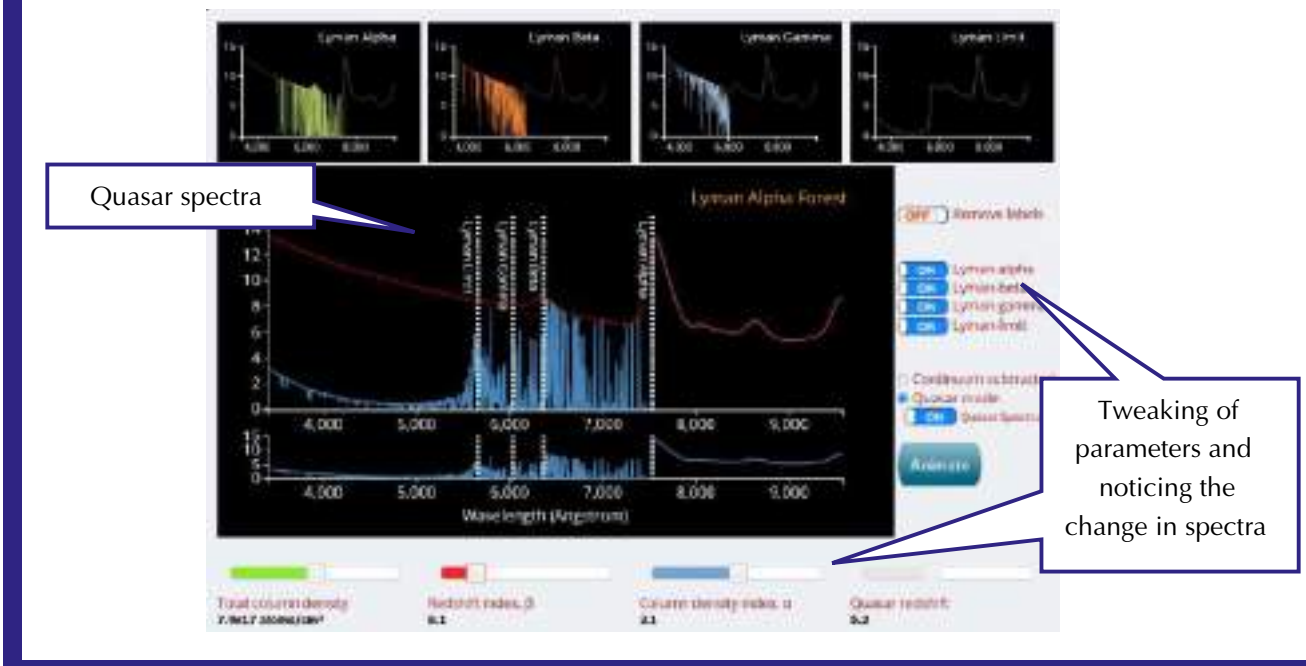


Fig. 5 User interface for analyses of quasar spectra

- A pilot-scale platform will be developed based on the feedback of the in-house astronomers
- The selection of niche students with astronomy backgrounds would begin in November 2022. Based on test cases and feedback, an upgraded version will be launched in January 2023

2. Discovery of exoplanets & Astronomy for inclusion

PKC plans to make another exciting citizen science program for the general public based on analysing data for the search for exoplanets i.e. habitable planets beyond Earth. PKC will collaborate with Dr. Ravi Kopparapu, planetary scientist, NASA Goddard Space Flight Centre who is an expert in exoplanet research to develop this project.

When observing emissions from a star, usually there is a dip in the brightness observed when a planet transits in front of its host star. This dip in the stellar spectra can be identified in two ways:
1. General public looking for the dip in the graphical data
2. The audio data from such stars getting analysed by visually impaired citizens where they identify changes/ gaps, empowering the visually impaired for astronomical data analysis

Researchers can convert various 2D datasets into audio using open access software developed by a visually impaired astronomer Dr. Wanda Diaz-Merced (European Gravitational Observatory, Cascina) to complete the parenthesis. This technique is termed as 'sonification'. Using such audio clips, we can introduce basic astronomical concepts to the visually impaired. Since the data gets analysed using a different medium, it adds to the accuracy of the analyses.

Most importantly, it boosts the confidence of visually impaired citizens where their hearing capacity can be used as a resourceful asset in scientific research. This project is likely to commence in mid-2023.

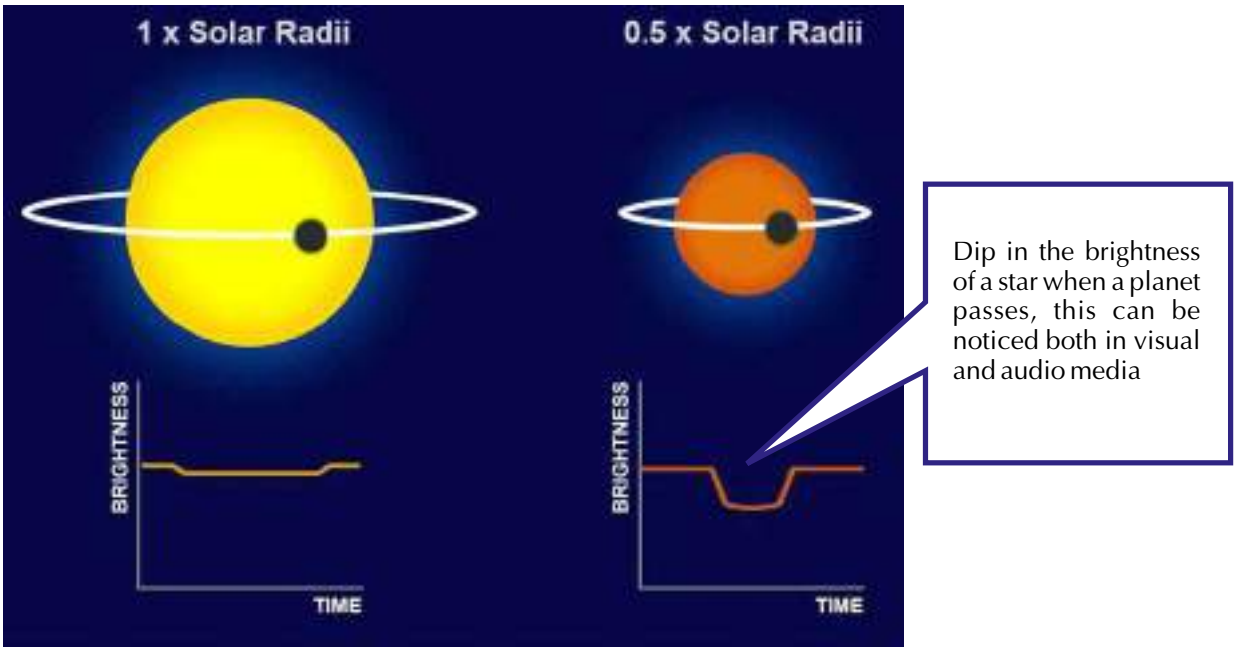


Fig. 6 : The Transit method used for detection of exoplanets

Planned activities

- Reach out to numerous science enthusiasts among the citizens via amateur clubs and societies
- Reach out to scientists from various domains to invite them to host the data for analysis
- Develop a platform for astronomical analyses for visually impaired citizens

Development of Artificial Intelligence Consortium for Biology and Chemistry

There are groups with expertise in data analytics and AI in various institutions and industries in Pune. Researchers from these groups have been collaborating with domain experts from biology and chemistry on problems of mutual interest.

These collaborations have led to significant development of tools, techniques, and publication of research papers which have been very well received by the community. To broaden the areas over which such collaborations can take place in a sustained fashion, and to provide a common platform for the purpose, PKC initiated a meeting of senior scientists from the National Chemical Laboratory (NCL), National Centre for Cell Science (NCCS), IISER-Pune and PKC in June 2022. These discussions led to the conceptualization of the program - Artificial Intelligence Consortium for Biology and Chemistry. Additional experts from institutes and industries in Pune will be joining the program.

Activities

The consortium will enable biologists, chemists, and people with expertise in the application of AI to perform the following:

- Undertake problems in the broad areas of biology & chemistry which would benefit from the use of AI

- Conduct workshops and meetings with national and international experts to identify new areas in biology and chemistry where AI can make a significant contribution
- Conduct courses in data science and AI appropriate for students and young researchers in biology and chemistry as a part of skills development
- Conduct an internship program for undergraduate and masters level students from institutions and universities
- Create a website for the exchange of ideas, results, codes, and other development.
- Over time, scale the programme to other clusters and groups

Progress

- A number of problems for applications of AI to Chemistry have been identified in discussion between PKC and groups in NCL and work on those has been initiated. Similarly, work on applications of AI techniques to biological problems has commenced with groups in NCCS
- Discussions have been initiated with the National Supercomputing Mission for the use of high-end supercomputing resources which would be needed for certain applications, like developing digital twins of pilot scale chemical plants
- Courses and workshops are being planned for the last quarter of 2022. Discussions have begun with some institutes for starting an internship program and funding sources are being approached for various parts of the program including skill development

Technologically enabling urban forestry efforts in Pune

Drawing from databases related to urban morphology, land records, weather, and climate, soil types, vegetation and tree census, groundwater, etc, as well as agent modeling and crowd-sourced information, 'ConnecTree' is capable of enhancing the synergy and efficiency of plantation drives conducted by citizens, corporates and civic bodies.

Intended Impact

- Increased survival of plantations in urban public places
- Improved conservation efforts through interaction between citizens and civic bodies

Progress

- No. of saplings brought under tracking / IT platform: 200
- Survival Rate of sponsored saplings: 70%

ConnecTree platform is publicly available at: https://bit.ly/3ff1arL

Fig. 7 . User interface of the ConnecTree Platform

Partners

Funding Partners

University of Southampton

Program Partners

ज्योतिर्विद्या परिसंस्था

IUCAA

tifr HBCSE

Khagol Vishwa

Nehru Centre

IMPACT REPORT | 2020-22

CAPACITY BUILDING

> How nations develop their human capital can be a more important determinant of their long-term success than virtually any other factor.
>
> **The Global Human Capital Report 2017**
> (World Economic Forum)

According to the Periodic Labour Force Survey (PLFS) 2017-2018, conducted by the Ministry of Statistics and Programme Implementation, GoI, India will have a total workforce of 404.15 million people, with around 70 million individuals of working age (15-59 years) by the year 2023. To ensure that a large portion of the task force is employable, there is an urgent need for skill development as per contemporary industry needs.

India is on its way to becoming a major global knowledge-based economy. Development of skills pertaining to Science, Technology, Engineering, and Mathematics (STEM) amongst youth is needed to achieve this goal. Recognizing this requirement, the Pune Knowledge Cluster is working towards providing opportunities to students, educators, young researchers, and professionals to improve their knowledge base and acquire advanced skills through interdisciplinary training programs.

PKC in collaboration with industry and academia conducts capacity-building programs aligning with its various verticals namely Health, Environment, Sustainable Mobility, Big Data, and Artificial Intelligence. PKC's prime focus is to bridge the knowledge gap between skills acquired through conventional education and that required by industries and research institutions. PKC is committed to empowering STEM education in schools and colleges through various pedagogical programs and outreach activities.

Through its various initiatives, PKC's Capacity Building vertical aligns with several SDGs, national missions, and national policies.

Projects of this vertical align with:

NATIONAL MISSIONS

- National Education Mission
- National Mission on Education through Information and Communication Technology (ICT)
- National Education Policy (NEP) 2020

SUSTAINABLE DEVELOPMENT GOALS

04 QUALITY EDUCATION

17 PARTNERSHIPS FOR THE GOALS

Objectives

- To facilitate high-end skilling and knowledge enhancement in youth by conducting interdisciplinary training programs & courses
- To promote scientific temperament in society by hosting ciitizen centric science talks by experts
- To promote STEM education via training programs on digital literacy and 21st century skills for students, pedagogy training programs for teachers, and scholarships & mentorship programs for girls students and entrepreneurs in STEM

Highlights

Number of Inter-disciplinary Training Courses conducted : 12
Beneficiaries : 668 Mentors involved : 115

Number of Inter-disciplinary Training Workshops conducted : 2
Beneficiaries : 62 Mentors involved : 11

Number of Citizen-centric Talks conducted : 49
Beneficiaries : 4859

Funds raised for STEM Programs: INR 86 Lakhs

Activities

Various activities conducted under the capacity building vertical include:

- Citizen-Centric Science talks
  - Special Talks
  - India S&T@75 series
  - Domain-Specific Talks
- Interdisciplinary Training Programs & Courses
- STEM Initiatives

Citizen-Centric Science Talks

Impact:
A total of 49 talks have been hosted by PKC which have been attended by more than 4800 individuals. All the talks are available on PKC's official YouTube channel which can be used as a knowledge repository as per the learning requirements of the audience /subscribers.

Special Talks

Dr. R. A. Mashelkar
(Former Director - General of the Council of Scientific and Industrial Research (CSIR), President of Indian National Science Academy (2004-2006), President of Institution of Chemical Engineers (2007) and also the President of Global Research Alliance (2007-2018). First Chairperson of Academy of Scientific and Innovative Research (AcSIR). Fellow of the Royal Society, Fellow of the Royal Academy of Engineering (FREng), Foreign associate of US National Academy of Engineering and the US National Academy of Sciences.

Title of the talk : Sustainable Inclusive Growth through Gandhian Engineering
Held on : 2nd October 2020

Lieutenant General (Dr.) Madhuri Kanitkar
PVSM, AVSM, VSM

Title of the talk : My Journey: In Search of Research
Held on : 30th January 2021

Prof. Raghavendra Gadagkar
DST Year of Science Chair Professor, Centre for Ecological Sciences,
Indian Institute of Science (IISc), Bangalore

Title of the talk : Can We Learn from Insect Societies?
Held on : 10th July 2021

Dr. Gagandeep Kang
MD, PhD,
FASc, FNASc, FNA, FRCPath, FAAM, FPH, FRS

Title of the talk : Prevention is Health and Wealth
Held on : 30th October 2021

India S&T@75 Series

CELEBRATING 75 YEARS OF INDIA'S S&T JOURNEY

As a part of the "India S&T@75" events, during the countdown to the 75th year of India's independence, PKC in association with the Indian Academy of Sciences (IAS) organized a number of lectures on scientific topics. These lectures were delivered by Fellows and Associates of the Indian Academy of Sciences (IAS). The lectures covered a wide variety of topics, highlighting some of the cutting edge science and technology developments made in the country over the past 75 years.

10 webinars have been conducted under the "India S&T@75" series.

Date	Topic	Speaker
19th June 2021	Statistical Search for a Genetic Connection Between Tobacco & Oral Cancer	Prof. Anil Gore
26th July 2021	Mathematical Physics & Reality	Prof. Sunil Mukhi
14th Aug 2021	Conserving Biodiversity, Towards a Scientific Approach	Prof. Madhav Gadgil
11th Sept 2021	Planning for a Clean & Green Tomorrow: Options and Opportunities	Prof. Satishchandra Ogale
9th Oct 2021	The Indian Monsoon & its Variability	Prof. Sulochana Gadgil
13th Nov 2021	Nature & Nurture: How the Environment Shapes our Genes	Prof. Sanjeev Galande
22nd Jan 2022	Building Science Park: Exploratory, Innovative Space for Experiential Learning	Prof. Dilip Kanhere
9th April 2022	M N Saha & S S Bhatnagar as pioneers of Research & Development in India	Prof. Arun Grover
28th May 2022	Phase transition in spaces of non-integer dimensions : Fractals	Prof. Deepak Dhar
9th July 2022	Evolution, Energetics & Environment of Energetic Explosions	Dr. Poonam Chandra


PLANNING FOR A
CLEAN AND GREEN TOMORROW
OPTIONS AND OPPORTUNITIES


PUNE KNOWLEDGE CLUSTER AND INDIAN ACADEMY OF SCIENCES PRESENT
INDIA S&T @ 75 LECTURE SERIES
LECTURE 5
THE
INDIAN MONSOON
AND ITS VARIABILITY
DETAILS
SATURDAY | 9TH OCTOBER 2021 | 11.00 A. M.
LIVE STREAM ON
About the Speaker
Prof. Sulochana Gadgil
Fellow, Indian Academy of Sciences


Building Science Park:
Exploratory, Innovative Space
for Experiential Learning


PHASE TRANSITIONS
IN SPACES OF NON-INTEGER
DIMENSIONS: FRACTALS


INDIA
SCIENCE & TECHNOLOGY
75


M. N. Saha
S. S. Bhatnagar
PIONEERS OF RESEARCH AND DEVELOPMENT IN INDIA


NATURE & NURTURE:


MATHEMATICAL
PHYSICS
AND REALITY
MONDAY, JULY 26, 2021
11.00 AM
JOIN US!


STATISTICAL SEARCH
FOR A GENETIC CONNECTION
BETWEEN TOBACCO & ORAL CANCER

IMPACT REPORT | 2020-22

Domain-Specific Talks

CODATA Talk series (BIG Data and AI)

PKC - CODATA Webinar series:
This webinar series is run in collaboration with CODATA - National Committee & The Indian National Science Academy (INSA). This series aims to promote Data Science outreach, and FAIR data advocacy.

Date	Topic	Speaker
20th July 2021	Data Democratization	Dr. Neeta Verma Director General, NIC
24th August 2021	COVID-19 Data and Analysis	Dr. Joy Merwin Monteiro, IISER Pune
21st Sept 2021	Big Data & The Square Kilometer Array (SKA) Telescope	Prof. Yogesh Wadadekar, National Centre for Radio Astrophysics - Tata Institute of Fundamental Research, Pune
15th Nov 2021	Machine Learning & Artificial Intelligence for Geoscience Applications	Dr. Deepak Subramani, Indian Institute of Science (IISc), Bangalore

SustEN Talk Series (Sustainability and Environment)

PKC's Sust-En series consists of public talks, focused group discussions and workshops with experts in the environment and sustainability space. Through this series, PKC aims to promote collaborations, co-creation of technologies, and conceptualization of city-scale projects to solve key issues related to carbon emissions, waste-water treatment, improving air quality, and green energy production.

Date	Topic	Speaker
22nd March 2022	Importance Of Green Spaces For Well Being Of Citizens	Dr. Jayant Kulkarni, Indian Forest Service (IFS)
22nd June 2022	How India can expand forest and tree cover to meet its Sustainable Development (SDGs) and Climate Goals	Dr. Rajiv Kumar Chaturvedi, Assistant Professor at BITS Pilani, K. K. Birla, Goa Campus.

Health Talk Series (Health)

PKC's Health talk series aims to promote active discussions on mapping, tracking, mitigation, and understanding the impact of diseases at a city level. The series hosts talks, stakeholder meetings, and workshops to highlight health issues that plague the city and potential measures for their mitigation. It will also showcase research, and clinical and technological advances in the healthcare ecosystem.

Date	Topic	Speaker
7th- 8th July 2022	Targeted therapies in Oncology	Dr. Anuradha Choughule, Professor & Faculty Scientist, Homi Bhabha National Institute (HBNI) Consultant Molecular Laboratory,Medical Oncology at Tata Memorial Hospital (TMH), Mumbai.
17th May 2022	Prevention and Control of Hypertension	Dr. Harshal Pandve, Professor & Head, Dept. of Community Medicine (PSM), PCMC's PGI-YCMH, Pimpri, Pune
28th June 2022	Importance of Epidemiology from a Public Health Perspective	Dr. Prakash Doke, Professor, Department of Community Medicine, MGM Medical College
27th July 2022	Evidence-based Decisions in Healthcare: The Role of Statistics	Dr. Chitra Lele, President & Founder, Actu-Real, Inc.

Sustainable Mobility

PKC's Sustainable Mobility talk series aims to foster active discussions on the use of effective and sustainable transportation systems for cities.

Date	Topic	Speaker
26th Feb 2022	PKC National Science Day special talk: Electric and Sustainable Mobility	Mr. Manoj Kumar Daniel, Deputy General Manager, Maha-Metro Rail Corporation Limited Pune Dr. Rahul Walawalkar, Founder & President, India Energy Storage Alliance (IESA), President & MD, Customized Energy Solutions India Ltd. Dr. Sushil Ramdasi, Deputy Director, Powertrain Engineering Laboratory, Automotive Research Association of India (ARAI)

STEM Popularization Talks

a) Popularization of Citizen Science

Date	Topic	Speaker
22nd July 2021	Finding features in Galaxies: Introductory Lecture 1	Prof. Ajit Kembhavi, Principal Investigator, PKC
24th July 2021	Finding features in Galaxies: Introductory Lecture 2	Prof. Ajit Kembhavi, Principal Investigator, PKC
27th July 2021 31th July 2021 4th Aug 2021 8th Aug 2021	Finding features in Galaxies: Training Session 1 Training Session 2 Training Session 3 Training Session 4	Prof. Sudhanshu Barway, Assistant Professor, Indian Institute of Astrophysics, Bangalore
28th Feb 2022	One Million Galaxies! Launch event	1. Prof. Kembhavi (Principal Investigator, PKC) 2. Prof. Barway (Assistant Professor, Indian Institute of Astrophysics, Bangalore) 3. Dr. Ashish Mahabal (Lead Computational and Data Scientist, California Institute of Technology) 4. Prof. Changbom Park (Professor, Korea Institute for Advanced Study) 5. Dr. Disha Sawant (Assistant Program Manager, PKC)
13th July 2022	The Search for Alien Life in our Galaxy	Dr. Ravi Kopparapu , Scientist at NASA Goddard Space Flight Center

b) Conversations with Women Role Models in STEM

An initiative which aims to bring forward the journey of women in various fields of Science, Technology, Engineering & Mathematics (STEM). This series is conducted in an informal conversational format to help the audience relate to the lives of successful women professionals in S&T, knowing first-hand about their success stories, their failures, and how they moved ahead to make a mark in their field. We hope this initiative will inspire young women to break gender stereotypes, societal barriers and encourage them to pursue careers in STEM.

Date	Topic	Speaker
30th June 2022	My Journey in Chemistry	Dr. Shobha Waghmode, Professor & Head, Department Of Chemistry, MES Abasaheb Garware College, Pune.
30th July 2022	My Pursuit of a Research Career in Drug Discovery	Prof. Sadhana Sathaye, Professor of Pharmacy, Institute of Chemical Technology (ICT), Mumbai.

Interdisciplinary Training Programs & Courses

PKC in collaboration with diverse stakeholders conducts courses and training programs with an aim to empower students, young researchers and working professionals with employability skills pertaining to Industry, academia, entrepreneurship.

Responsible Artificial intelligence (5 April - 22 March 2021), in partnership with Persistent Systems Ltd.

Impact

14 training courses across different technical domains of science, technology, and innovation have been conducted so far (Fig. 1) by experts from different partner organizations including R & D organizations, academic institutions, and incubation centers (Fig. 2).

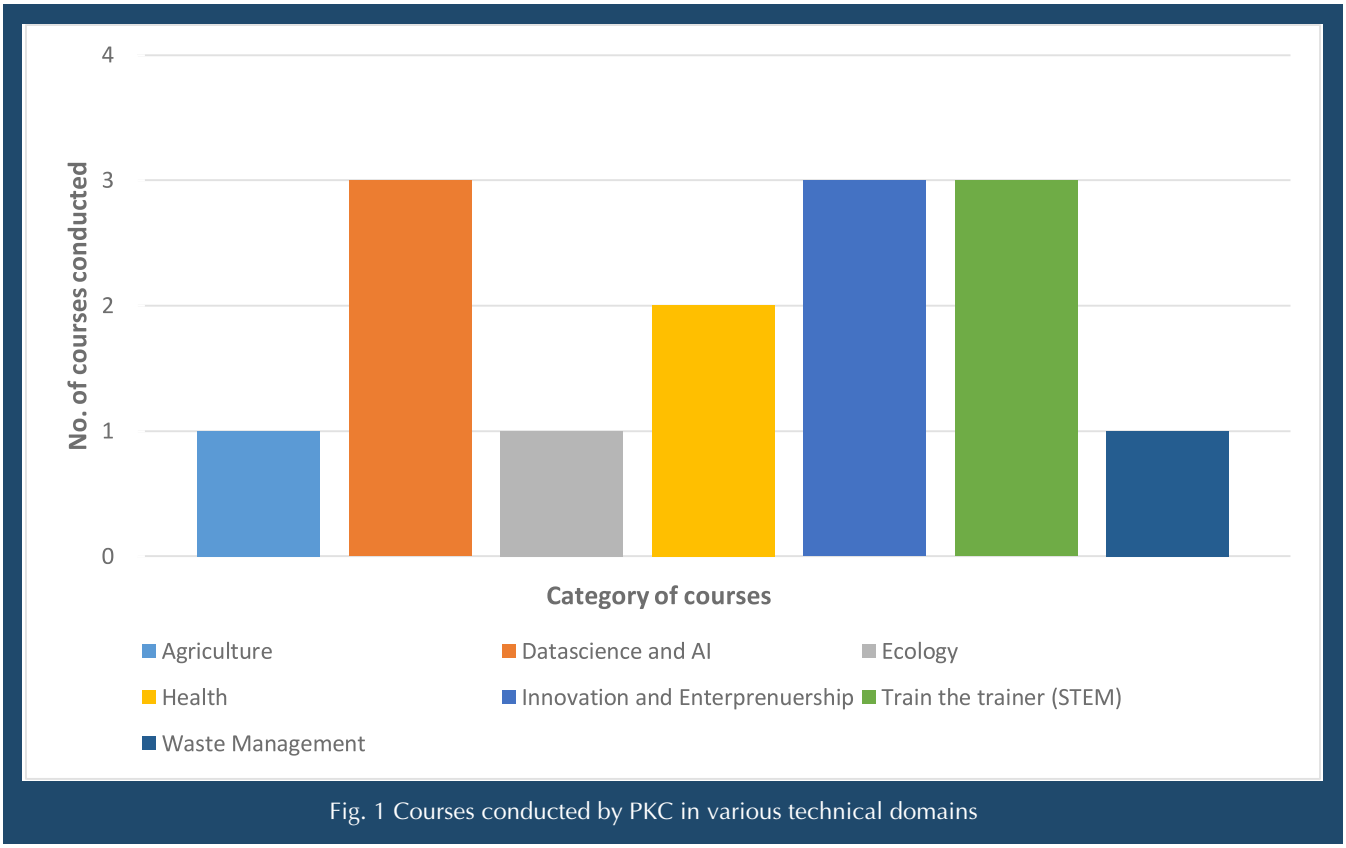


Fig. 1 Courses conducted by PKC in various technical domains

A total of 727 individuals benefited from the various courses conducted by PKC. (Fig. 3). 53% of the participants were females (Fig. 4), 23% were students, 40% were teachers and 37 % were working professionals (Fig. 5).

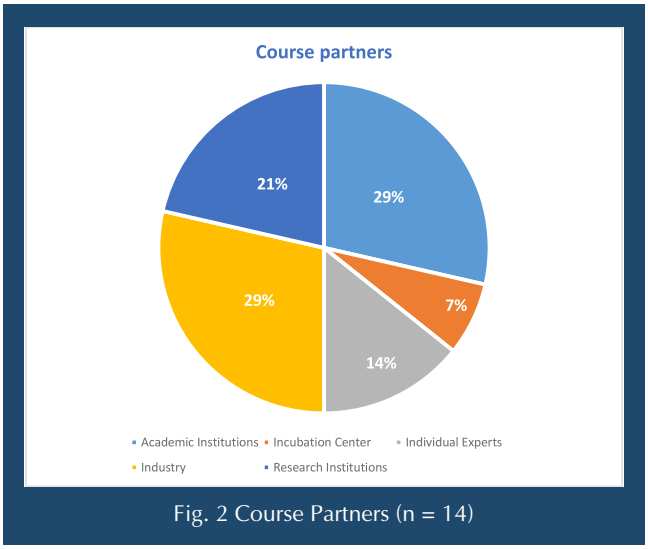


Fig. 2 Course Partners (n = 14)

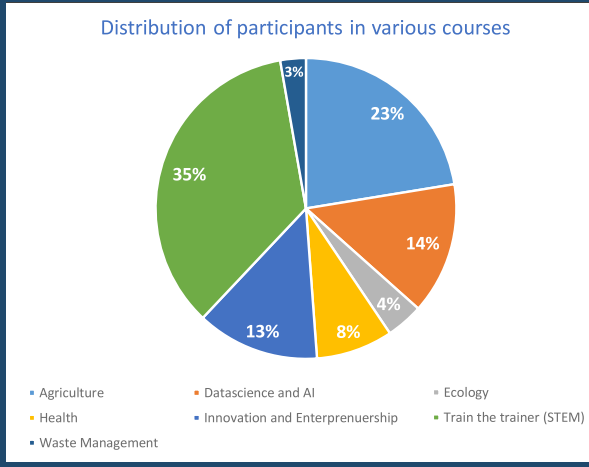


Fig. 3. Distribution of participants in various courses (n = 727)

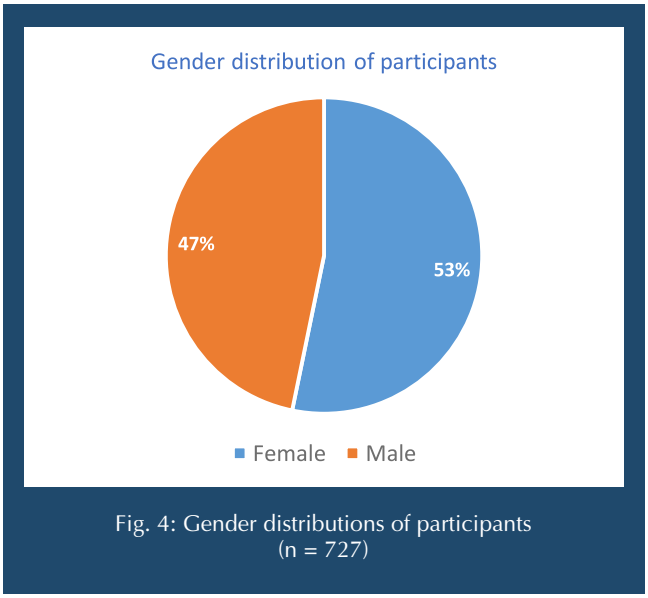


Fig. 4: Gender distributions of participants (n = 727)

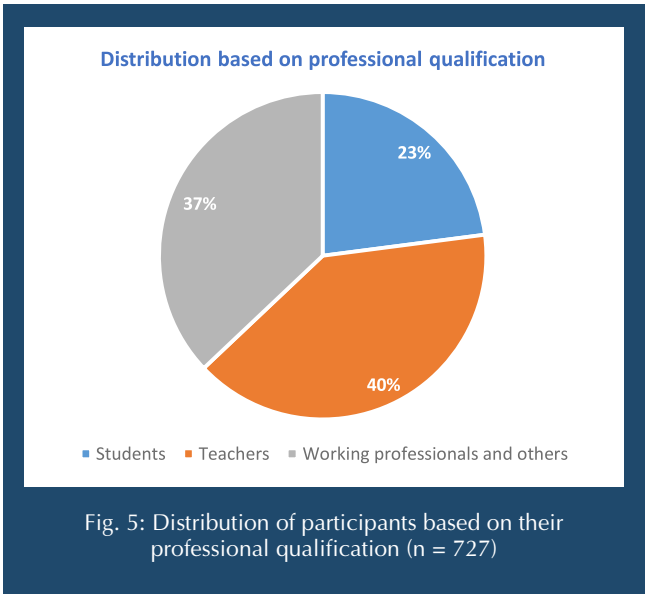
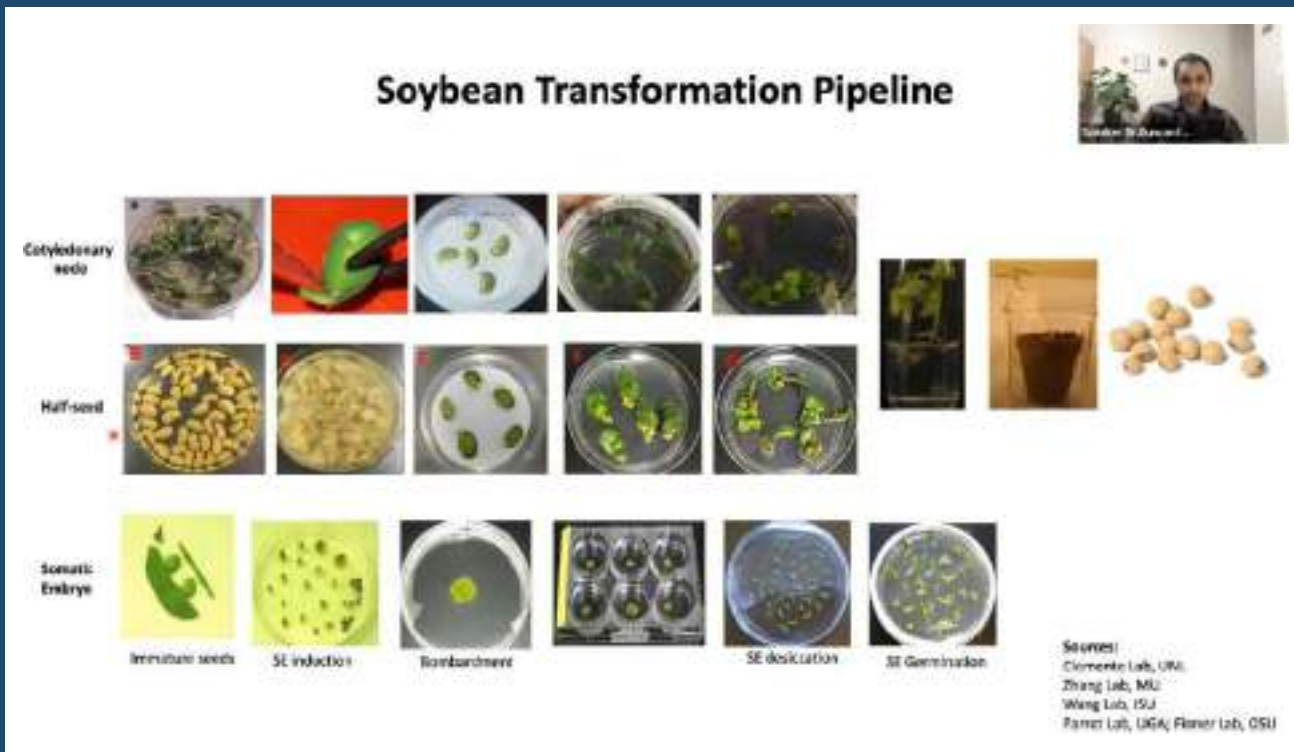


Fig. 5: Distribution of participants based on their professional qualification (n = 727)

Details of courses conducted by PKC during Jan 2021- May 2022

Title	Partner Organisation	Date	Total Sessions	Total Beneficiaries
A Virtual Course on Vaccine Production, Basics, Pitfalls, and Troubleshooting (An industry perspective on vaccine production)	Serum Institute of India, PVT.LTD, Pune	15th Jan '20 - 5th Feb '21	10	28
Microbial Processes for Energy Recovery from Organic Wastes (Theoretical knowledge and industrial know-how on working of microbial biofuel cells)	Agharkar Research Institute, Pune	15th Feb - 26th Feb '21	12	20
Skills for Innovators (Soft skills and management principles for effective innovation and entrepreneurship)	Venture Center, Pune	16th Feb - 25th Feb '21	4	13
Natural Language Processing (NLP) acceleration Program (latest trends and techniques in NLP)	Icertis, Pune	8th April - 25th May '21	9	48
A Primer on Biodiversity and Ecology of Freshwater Ecosystems of the Western Ghats (A food chain-based approach to learning biological components of the freshwater ecosystem in western ghats)	Agharkar Research Institute, Pune	15th April - 30th April '21	9	29

Title	Partner Organisation	Date	Total Sessions	Total Beneficiaries
Responsible Artificial Intelligence (Current status, challenges, and future opportunities)	Persistent Systems, Pune	5th April - 31st May '21	15	23
Plant Breeding Today: New Techniques, New Skills (Real-time development of new varieties by molecular methods)	Dr. Vidya Gupta (CSIR- NCL, Pune), Prof. Sujata Bhargava (Dept Of Botany, SPPU)	14th June - 25th June '21	10	163
Understanding and Exploring Epidemiology (Concepts and methods in modern times)	School of Health Sciences, (SPPU)	20th July - 27th August '21	10	32
Entrepreneurial skills development course for young researchers in biotechnology (Idea generation, opportunity evaluation, company formation, funding opportunities for biotech start-ups)	Agharkar Research Institute, Pune	11th Oct - 29th Oct '21	20	63
Starting the Innovation Journey (Basics and best practices in innovation)	Dr. Aditya Gondhalekar, Capgemini, Pune	20th- 27th Nov - 4th Dec '21	3	20
Concepts in Science and Skill Development Program विज्ञान विषयातील संकल्पना आणि कौशल्य विकसन कार्यक्रम (Bilingual pedagogy training for teachers)	District Institute of Education and Training (DIET), Pune	18th Oct '21 - 10th Jan '22	12	194
Course with Hands on Training: Artificial Intelligence and Machine Learning in Cyber Security (Primer on IBM's industry-leading Security Intelligence solutions for aspiring Cyber Security Professionals)	IBM India Software Labs (ISL)	28th Feb - 4th April 2022	12	32
STEM Teacher Training Workshop (Pedagogy training using hands-on activities and science toys)	SPPU science park, Savitribai Phule Pune University	21 - 22 April 2022	4	40
Tools and Techniques in STEM Education (Pedagogy training using hands-on activities and foldscope)	Ajeenkya DY Patil University,Pune	27 May 2022	1	22



Plant Breeding Today: New Techniques, New Skills (14 - 25 June 2021)

STEM INITIATIVES

As per predictions by the National Science Foundation, 80% of jobs in the next decade will require skills pertaining to Science, Technology, Engineering, and Mathematics (STEM). Exam-focused learning model which emphasizes more on fact memorization or rote learning is leading to a lack of creativity, innovativeness, and problem-solving skills in Indian students. Therefore there is a need for including inquiry-based learning modules to be incorporated in school curriculum along with development of skill sets like digital literacy and sustainability amongst students.

Pune Knowledge Cluster is deeply engaged in programs that encourage teachers to adopt pedagogical techniques focused on inquiry-based teaching and learning with the use of digital tools. The programs are especially run in schools that are low on resources with an emphasis on engaging in hands-on activities for experiential learning.

PKC has two ongoing STEM initiatives:

- Improvement Programs for STEM Teaching & Learning in Classrooms
- Support Programs for Women in STEM

Objectives

- In line with NEP 2020, foster critical thinking, analytical ability, logical reasoning and curiosity
- Encourage teachers to adopt pedagogical techniques focusing on inquiry-based, hands-on learning
- Follow a train-the-trainer approach for scaling initiatives
- Setting up or strengthening of Atal Tinkering Labs in schools
- Focus on the use of digital tools, introduce AI and ML in high schools
- Create a digital repository of STEM resources

Improvement Programs for STEM Teaching-Learning Methodologies in Classrooms

Ongoing Projects

Capacity building of school teachers in STEM

PKC in collaboration with the local administrative authorities has been actively involved in creating programs for teachers in government schools in and around Pune.

PKC team at the launch of 'Shala Sudhar Karyakram' organized by Pune Zilla Parishad and District Institute of Education and Training (DIET), Pune at The Divisional Commissioner's Office on 6th May 2021. Launched by Hon. Deputy Chief Minister Shri. Ajit Pawar, the Shala Sudhar Program aims to improve the quality of school infrastructure and teaching in and around Pune.

Concepts in Science and Skill Development Program (विज्ञान विषयातील संकल्पना आणि कौशल्य विकसन कार्यक्रम)

PKC and District Institute of Education and Training (DIET), Pune surveyed 1500+ school teachers in the Pune district, to understand gaps in teaching methodologies for STEM. Pedagogical methods were designed based on the analysis of the data collected and over 450+ teachers from Pune Zilla Parishad schools were trained on using these methods for effective classroom and virtual teaching.

Hands-on STEM Teacher Training

PKC in collaboration with the Center for Science Education and Communication (CSEC), Savitribai Phule Pune University (SPPU) organized a 2 Day Hands-on STEM Teacher Training Workshop on 20th and 21st April 2022. The workshop was attended by 42 school teachers teaching 6th to 9th grades.

The workshop focused on hands-on training and conceptual understanding of scientific topics which teachers face challenges in teaching using conventional methods. This workshop was funded by Lenovo India under PKC's 'Teach with Tech' initiative.

Improvement Programs for STEM Teaching-Learning Methodologies in Classrooms

Ongoing Projects

Digital Literacy Skill Development Programs for Students

PKC in collaboration with Lenovo India implements a program called 'Teach with Tech' a two-tier STEM program for school students from 6th to 9th grade and their teachers. This project aims to provide an opportunity to students and teachers to access and adopt digital content related to science, mathematics and technology. PKC works with five schools - Vidyapeeth School (Pune University campus), Modern High School (Ganeshkhind), Shivaji Vidya Mandir (Aundh), Gholap High School (Sanghvi) and Nutan Marathi Vidyalaya Girls School (Sadashiv Peth) in Pune.

Planned Projects

a. Gamification in STEM Learning
PKC is working with a group of education experts to develop programs which include gamification at the curriculum level in schools. It aims at designing and developing gaming software/tools and training programs that are mapped with school and undergraduate curriculum at elementary & secondary levels. The training programs will be designed to train teachers to develop and design game based tools in alignment to NEP 2020. The broad objective is to create a pool of trained teachers (train-the-trainer approach), who will in turn train more teachers which will benefit a larger group of students. In the course of time, a repository of game-based teaching-learning platforms will be developed through a participatory approach and deployed at scale.

b. STEM labs
The Atal Tinkering Labs (ATLs), established across the country by Atal Innovation Mission (AIM), NITI Aayog, aim to foster curiosity, creativity, and imagination in young minds; inculcate skills such as design mindset, computational thinking, adaptive learning, computing, etc. PKC aims to integrate various themes aligned with its verticals such as air pollution, sustainable mobility, water management, solid waste management, public health and effective education with ATL-based activities and develop innovative projects to solve problems of the city. PKC aims to identify gaps in the use of already existing ATL STEM labs in the city to enable their strengthening. PKC also will enable ATLs to train teachers and students to utilise the ATL labs effectively. PKC aims to pilot this program in 5 ATLs STEM labs in Pune.

Support Programs for Women in STEM

PKC is committed towards enhancing the participation of women in basic and applied sciences through mentoring, research and scholarship programs.

Ongoing Project

WEnyan Scholarship
& Mentoring Program for Women in Chemistry

An initiative by Pune Knowledge Cluster and BASF Chemicals India Private Limited, the program aims to offer funding support, mentorship and entrepreneurial skill development to deserving women candidates in Maharashtra. Scholarships and grants are offered to women from marginalized communities at the undergraduate and post graduate level for pursuing research or entrepreneurship in Chemistry and allied areas. Through this initiative, PKC aims to increase enrollment and retention of women in scientific streams creating a more gender-equal workforce.

Wenyan Awareness Sessions:- Left -Guru Nanak College of Arts, Science, and Commerce, Mumbai, 23rd June 2022, Top Right: Guru Nanak Institute of Research and Development (GNIRD) Mumbai, 22nd June 2022. Bottom Right: Yashwantrao Bhonsale College of Pharmacy, Sawantwadi, 24th May 2022. PKC conducted WEnyan Awareness Sessions in 22 colleges across various districts of Maharashtra. between April - June 2022. Sessions were attended by 1442 students.

Partners

Funding Partners

Program Partners

PARTNERS

FUNDING
BASF Chemicals India Private Limited
Cummins Foundation
Hindustan Unilever
Lenovo India
Persistent Foundation
Rockefeller Foundation
Schlumberger
University of Southampton
ACADEMIC ORGANIZATIONS
Armed Forces Medical College, Pune
BJ Medical College, Pune
Dr. Bhanuben Nanavati College of Architecture for Women, Pune
Indian Institute of Science Education and Research, Pune
Jnana Prabodhini Foundation, Pune
Maharashtra University of Health Sciences, Nashik
Savitribai Phule Pune University, Pune
Symbiosis International University, Lavale, Pune
Symbiosis Medical College for Women, Pune
Symbiosis Statistical Institute, Pune
RESEARCH ORGANIZATIONS
Agharkar Research Institute, Pune
Automotive Research Association of India, Pune
Centre for Development Of Advanced Computing, Pune
Centre for Materials for Electronic Technology
Christian Medical College, Vellore
CSIR-Centre for Cellular and Molecular Biology, Hyderabad
CSIR-National Chemical Laboratory, Pune
Deenanath Mangeshkar Hospital
Defence Institute of Advanced Technology, Pune
FLAME Centre for Earth and Environment, FLAME University, Pune
King Edward Memorial Hospital and Research Centre, Pune
National Centre for Biological Sciences, Bengaluru
Noble Hospital, Pune
Symbiosis University Hospital and Research Centre
Wildlife Research & Conservation Society, Pune

PARTNERS

SOCIETIES & ASSOCIATIONS
CODATA National Committee
Indian Academy of Sciences
Indian National Science Academy
Institute of Electrical and Electronic Engineers, Pune
Society of Automotive Engineers, India
GOVERNMENT BODIES
District Institute of Education and Training, Pune Zilla Parishad
Pune Municipal Cooperation
Pune Smart City
INCUBATION/ INNOVATION CENTERS
C4i4 - Center for Industry 4.0, Pune
Venture Center, Pune
NGOS & CLUSTERS
Bhujal Abhiyaan, Mission Groundwater, Pune
Center for Environment Education, Pune
Samuchit EnviroTech, Pune
Water Valley, Denmark
INDUSTRY
Genepath Laboratories
GI BOTS
Icertis
Illumina
Infosys Springboard
International Business Machines
Persistent Systems
PH Diagnostics
Praj Industries
Premas Biotech
Sahayadri Speciality Labs
Serum Institute of India
Suburban Diagnostics
Suyog Lifecare Diagnostics
TATA Consultancy Services
Thyrocare

MoU's & MoA's

PKC has signed Memorandum of Understandings (MoU's)/ Memorandum of Associations (MoA's) with 30 organizations.

Ajeenkya D. Y. Patil University, Pune
Armed Force Medical College (AFMC), Pune
Automotive Research Association of India (ARAI) , Pune
BASF Chemicals India Private Limited
B. J. Medical College, Pune
Centre for Materials for Electronics Technology (C-MET), Hyderabad
Centre for Development Studies and Activities, Pune
College of Engineering Pune (CoEP), Pune
CSIR - Centre For Cellular And Molecular Biology (CCMB), Hyderabad
CSIR - National Chemical Laboratory, Pune
Defence Institute of Advanced Technology (Deemed to be University), Pune
District Institute of Education and Training (DIET), Pune
Dr. D. Y. Patil Vidyapeeth, Pune
Entrepreneurship Development Center, Venture Center, Pune
FLAME Centre for Earth and Environment, FLAME University, Pune
GAIA - The Earth Foundation
Indian Institute for Science Education & Research (IISER), Pune
Infosys Springboard
King Edward Memorial Hospital and Research Centre (KEMHRC), Pune
Lenovo India
MACS - Agharkar Research Institute, Pune
Maharashtra University of Health Sciences, Nashik
MKSSS's Dr. Bhanuben Nanavati College of Architecture for Women, Pune
National Centre for biological Sciences - Tata Institute of Fundamental Research, Bengaluru
Savitribai Phule Pune University (SPPU), Pune
Symbiosis International (Deemed University) Symbiosis Statistical Institute, Pune
Symbiosis International (Deemed University), Pune for and behalf of its Constituents 'Symbiosis Medical College for Women (SMCW)', Pune and 'Symbiosis University Hospital and Research Centre', Pune
Symbiosis International University, Lavale, Pune

IMPACT REPORT | 2020-22

PKC IN NEWS

Covid transmission slowing in Pune as 'Rt' nears zero level

NEHA MADAAN / TNN / Updated: Mar 3, 2022, 09:40 IST

दीर्घिकांच्या अभ्यासात नागरिकांचा सहभाग

THIS STORY IS FROM OCTOBER 19, 2021

Pune: Three-month course for teachers to better explain science

ARDHRA NAIR / TNN / Updated: Oct 19, 2021, 16:41 IST

BASF collaborates with the Pune Knowledge Cluster to launch WEnyan: a research scholarship program driven by Women for Women

THIS STORY IS FROM DECEMBER 22, 2021

Death rate in Pune city during second wave less than in first: Study

NEHA MADAAN / TNN / Updated: Dec 22, 2021, 09:18 IST

Ravindra Thapa
Corporate Communications, Asia Pacific
Mumbai
+91 22 6236 4008

पुणे Published: February 16, 2022 04:21 PM

Science | विज्ञान : दुनिया में खगोलविदों के लिए सार्वजनिक रूप से डेटा उपलब्ध कराएगा भारत

Deepak Pandey
रिपोर्टर | नवभारत.कॉम

Pune: Lectures on vaccine production by Serum Institute from January

ARDHRA NAIR / TNN / Updated: Dec 29, 2020, 10:42 IST

Citizens to keep an eye on under care saplings via AI

तुम्हालाही करता येणार अवकाश संशोधन

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The Pune Knowledge Cluster is coordinating a genome surveillance project funded by Rockefeller Foundation as part of which samples are procured from all over Pune and beyond through the B J Government Medical College.

Arabinda Mitra: 'Pune has potential to solve national and international issues'

PKC, which has been set up to create a common platform facilitating healthy interaction between researchers, R&D and industries in Pune, was approved by the Union government in August.

खगोलशास्त्रज्ञ बनून काही तरी असेल. पण, अवघड समीकरणे गंची ही इच्छा अपूर्णच राहीली आहे. एका महाशोधाचा भाग

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Pune gets official sanction for Knowledge Cluster

Pune News

Pune Knowledge Cluster to launch citizen science astronomy programme on National Science Day

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PUNE KNOWLEDGE CLUSTER

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