DR. NIRMAL KUMAR,J.I
PROFESSOR, HEAD, EX-PRINCIPAL,ISTAR

CONTRIBUTION IN THE FIELD OF ENVIRONMENTAL SUSTAINABILITY

I Prof. Dr.Nirmal Kumar J I obtained Ph.D degree entitled "**Ecological studies of Certain Ponds with reference to Eutrophication and Weed growth around Anand Gujarat"** from Sardar Patel University (1990), Gujarat,thereafter worked as a Lecturer in Botany, P.G Department of Botany , Jai Hind College , Dhule M.S (1991-96) and worked as Research Investigator on **"Conservation of Biodiversity Inventory Network program on Western Ghats"** in Centre for Ecological Sciences, Indian Institute of Sciences,(IISc)Bangalore 1994-96.Completed 37 years of Environmental Research,32years of teaching experience at UG,PG, Ph.D level as the capacity of Senior lecturer, Head in N V Patel Science College (1996-2005) and Reader, Professor, Head in P.G. Department of Environmental Science and Technology and as Principal Institute of Science and Technology for Advanced Studies and Research (ISTAR)(2005-2022) Vallabh Vidyanagar , Gujarat.

I have **produced 19 Ph.Ds from Sardar Patel University in the subject of Enivironmental Science, Biotechnology and Botany,** published more than 230 research papers at National and International reputed peer reviewed scientific journals, completed 15 major and minor research projects from UGC,MoEFCC, MoES, New Delhi, Guj Forest Department,Climate Change Department, GUJCOST,Gandhinagar, FES Anand,and International Collaborative project AIST Japan as a Principal Investigator, 22 Google/ Bookspublished (https://vidwan.inflibnet.ac.in/profile/270934 ,https://scholar.google.co.in/citations?user=upm4FnsAAAAJ&hl=en).

I was recipient of research and academic appreciation certificates, Gaurav Puraskar, honors and awards, some of them are **Hari Ohm Ashram Award** 1997, **Dr. C.K. Shah**

Award 2008,2011,**Award of Exemplary Performance**-2007, **FELLOW, National Environmental Association** 2009 Ranchi, Member, American Chemical Society, USA 2012, **biography published in WHO's WHO in the World USA**, 2009, **Bharat Shikshak Ratan Award** 2011, Associate Fellow,**Gujarat Science Academy**,2011, Gujarat , Award of Bharat Ratna Dr Sarvepalli Radhakrishnan 2018, Bharat Vidya Shiromani Award 2019, "**Certificate of Contribution award**" by Gujarat Cleaner Production Centre (GCPC) jointly with Ministry of Environment, Forest and Climate Change in Interlinking of Industry, Academia and Government for the year 2018,19,20 and 23, **appreciation Award** 2022 for Green Audit Cell by GCPC, **Best P.G Teacher Award**-2022 by Gujarat Science Academy, **STAR EDUCATION Award** 2023 by Education Department, Government of Maharashtra, **Eminent Scientist Award**-2024 by National Environmental Science Academy (NESA) , New Delhi and many more (Please refer CV and **http://nirmalkumarji.in/)**

Outstanding contribution of Dr. Nirmal Kumar made in Environment Sustainable Development : Worked on Biodiversity monitoring, Conservation, Restoration, Sustainable Development of Forests,Wetlands ecosystems of Gujarat, Maharashtra and Rajasthan, by involving students, Global Warming, Climate change and mitigation measures, Environmental pollution control technologies by Bioremediation, Biodegradation, NanoTechnology and societal services and charity work. Trained students , local community participation, local peoples for Conservation and Restoration of Forests,Wetlands Ecosystems in Gujarat. Produced young B,Sc, M.Sc and Ph.D Students , of EST ,ISTAR with their placements, who are glittering at present like stars in Environmental Sectors not only in Gujarat but also in India and Overseas.

During my scientific and academic career, I have been investigating following Environmental Sustainable facets on various Environments and Ecosystems of Gujarat, Maharashtra and Rajasthan (Please see list of publications, CV, http://nirmalkumarji.in/):

1. **Evaluated Biodiversity monitoring , Conservation,** Sustainable Development, Restoration , quantification of Anthropogenic pressures ,soil and plant nutrient dynamics in Tropical Forests like Semi-evergreen, Dry deciduous and Disturbed Dry deciduous forests of Navapur, Khatana, Ukalapani, Satpuda(Maharashtra), Waghai,Saputara, Dharmpur, Purna, Shoolpaneshwar Wild-life Sanctuary, Jambughoda Wild-life Sanctuary (Gujarat), Bilwara and Udaipur Forests (Rajasthan) where 50 Sq.Km human impact villages/ hamlets (10-15 no) with biodiversity rich land scape elements

(LSEs)were investigated since 1994. Evaluated biodiversity and Ethnobotanical-medicinal preparations made by local Vaidyas to cure ailments. Predominantly worked with aboriginal people on community based Biodiversity monitoring and conservation by people's participation, awareness and involved UG, PG and Ph.D students, lead a team of Botany and Zoology faculty, forest officials in the field studies. Educated ,trained UG, PG and Ph.D students, local people, communities on conservation initiatives, sustainable development; wise use of bio-resources for their day-to-day life. Conducted group meetings, get-to-gathers, competitions and rewarded local communities/ people to inculcate conservation practices, environmental awareness .

Evaluated rare, engendered,endemic, vulnerable, threatened,dominant species,wild varieties ,wise use of Major and Minor forest produce in every forest LSEs and medicinal plants its parts used by local folks-Vidyas, their unique treatments by innovative indigenous and traditional knowledge by the ethanomedicinal wild varieties of tulsi,neem,drumsticks,spices,tarmaric, palas,mavdo,kadam etc to cure arthritis, paralysis, leprosy, bone fractures, asthma, bronchitis, skin diseases, sleeping disorders etc. Patients come from various parts of Maharashtra, Madhya Pradesh and Gujarat to get low cost efficient treatment from these village Vidhyas in these forests. Local peoples and students practiced and experienced best way of biodiversity monitoring , conservation ,sustainability, restoration activities,wise use of bio-resources-minor and major, traditional practices, anthropogenic stress. Painstaking efforts were put along with team peoples,students, local communities for restoration activities of the degraded forest pockets. Identified unique forest ecosystems, need for in-situ conservation, developed TWO sacred groves in 1998 in Waghai forests. In studied tropical forests local communities regularly managing ecosystems and protecting by conservation and restoration activities, traditional practices- livelihood generation, development of plant varieties, herbal remedies for human medicine, low cost sustainable green practices, control on habitat loss, over exploitation, loss of Biodiversity,sustainable minor and major forest produce collection. **The Research Projects were funded by CES,IISc Banglore, MoEFCC,MoES, New Delhi,FES, Anand, and Gujarat Forest Department , Gandhinagar**

2. **Explored Trophodynamics and eutrophic status of Biotic and Abiotic nutrients** and assessed Pollution Status, anthropogenic stresses in National / International significant wetlands, educated local communities for conservation and sustainable

development (as in 1 above) strategies for aquatic environments - Nalsarovar Bird Sanctuary, Thol Bird Sanctuary, Vadwana lake, Pariage Lake, Kaneval Lake, Ratreshwar lake, many wetlands (belong to Wetlands of South East Asia) and each wetland surrounded by 3 to 9 villages, major Rivers- Narmada, Tapi, Mahi, Sabarmati, Banas, Mahishwo, Karicut canal and their Estuaries, Mangrove ecosystems at Wamleshwar, Khambat, Gulf of Kutch- Okha, Bet Dwaraka, Gopnath, Alang of West coast since 1987 .

Studied wetlands were categorized into Oligotrophic, mesotrophic, eutrophic, hypereutrophic nature. **Site specific management strategies and approaches were contributed to especially funding agency MoEFCC,MoES to make Nalsarovar, Thol ,all wetlands, later on recognized RAMSAR sites in 2012,2021 respectively**. Site specific results on protection, preservation, restoration of Wetlands, Fishes, shield and safeguard the migratory, residence and local birds contributed in conservation of aquatic biodiversity by local residents in surrounding villages.

Crocodile (*Crocodylus* palustris) endangered species migration, breeding, interactions were given high priority in 5 studied wetlands in Anand dist. Restored the aquatic ecosystems by eradicating invasive species (*Eichhornia crassipes L*) through physical mode(better than Chemicals) in summer periods of many of studied Eutrophic wetland ecosystems which resulted into elevated growth of submerged, marshy and free floating aquatic plants, fish and residence birds diversity in marshy wetlands. Documented controlled and managed activities- fish catch. collection of aquatic plants, boating, horse riding by local communities for livelihoods and sustenance . **The Research Projects were funded by CSIR,MoEFCC,MoES, New Delhi and FES, Anand**

3. Assessed Environmental Pollution control technologies by

A. Bioremediation and biodegradation of very toxic chemicals such as Bavestine, 2,4 D, isoproturon, pencycuron, Anthracine, pyrine , petroleum substances like Petrol, kerosene, diesel from contaminated soil environments by isolated bacterial, fungal, Cyanobacterial strains (identified by molecular markers) and developed efficient strains, used for the degradation by individual and constructed its consortia for degradation of these chemicals *invitro* and *Exsitu* studies. Enriched Soils after treated with efficient strains,grown agriculture crops like Tomato,Fenugreek,Wheat, Rice, etc.

New efficient, effective and tolerant bacterial, fungal, cyanobacterial strains and their constructed consortia degraded Bavestine, 2,4 D, isoproturon, pencycuron, petrol, kerosene, diesel, pyrine, anthracene, petroleum substance petrol,diesel,kerosene *in vitro*

and *ex-situ studies*. The fluctuation and impact of these chemicals were evaluated by measuring physical , metabolic, enzymatic and molecular characters.

B. Nanotechnology for Nutrient removal from Industrial effluents: Fabricated, characterized TiO_2,MnO, FeO, Fe_2O_3, ZnO with Silver doped nanoparticles and its Biogenic nanoparticles (Alovera, Neem), Biochar (from Plant wastes),and evaluated for de-colorization of dyes-Crystal Violet, Sudan Blue, Acridine Orange Dye, Congo red and remediated nutrients -PO_4, NO_3, SO_4, Hardness, heavy metals-Fe, Cr, Ni,Pb from pharmaceuticals, chemical and textile industrial effluents *in vitro and ex situ* under photocatalytic degradation-UV, artificial, solar radiations using microcosm studies. Fabricated doped with Silver on TiO_2, Fe_2O_3 nanoparticles under UV radiation ultimately proved efficient to remediate Nutrients, heavy metals,organic pollutants from industrial effluents (collected from Nandesari Industrial Estate) than other studied nanostructures in *Exsitu* Microcosm pilot studies using Alginate beads.**The Research Projects were funded by UGC New Delhi and GUJCOST, Gujarat**

Explored diet (food) dependent shifts in ruminal microbes of Indian buffalo Mehsani and Kankrej cattle breeds with two diets- green roughage and dry roughage by Metagenomic DNA isolation, shotgun library preparation, sequencing, bioinformatics approaches.

4. A. **Global warming and Climate change** :Extensively carriedout Climate change in relation to Ambient Air Monitoring, Air Pollution index, Air Pollution Tolerance Index (APTI) and Anticipated Performance Index (API), Green House Gas emissions,concentrations,Global warming,potential, Fluxes. Emission inrelation to temperature,light intensity, humidity, rainfall, wind velocity in Agriculture lands, aquatic environment, industrial sites, Urban and Village environments of Gujarat were investigated . Evaluated Global warming potential (GWP),Climate Change vulnerability in different sites- Industrial, Urban and Village environments of Anand, Ahmedabad, Surat Cities of Gujarat . Assessed effects of Climate change Vulnerability of Exposure, Sensitivity and Adaptation capacity to floods-2021,Tauktae cyclone Gujarat and all these results were sent to Climate Change Department, Govt og Gujarat,Gandhinagar.

B. **API, AQI and Air Pollution Tolerance index** were greater in all studied capital cities of India especially near industrial areas. Plant species Mango,Vad, Neem,Ashopalak,Gulmore,pipal,baniyan,palas,teak sps have high tolerance (API) to air

pollutants which can grow in Industrial area as Green Belt. GHG emissions, content, concentrations, turnover, Global Warming Potential were higher in Industrial sites, Urban areas Ahmedabad followed by Surat, Baroda, Anand while CH_4, N_2O contents elevated in Villages and Agriculture environments.During investigated period, Climate Change consequences lead to flooding in the state has affected over 1.6 million people,with more than 50 cm rain in 24 hours on 3 September,2021 in 44 villages of Rajkot,Jamnagar, Probandar,Valsad,Junagadh, Anand,Ahmedabad districts,evacuated in 72 centers. Besides, extremely severe Cyclonic Storm Tauktae was made landfall,destroyed buildings, uproots trees and electricity pylons, snaps wires and leads to floods,with wind speeds of 160 to 170 kilometres per hour on May 17,2021. More than 2,00,000 people were evacuated from their homes and authorities shut ports and major airports.

Evaluated Emerging and Legacy Pollutants: Monitored more than 300 emerging pollutants (non-degradable, non-synthesized in humans) Perfloroalkyl substances, perfloroalkyl carboxylic acids, perfloroalkyl sulphonic acids , Alkanes, alkenes, and carboxylic acids, PAHs, Bisphenols A,F, S, Polychlorobenzens in water, wastewaters, road side dust, atmosphere and human hair in major cities of Gujarat and capital cities of different states, India which is first report from India. PFAS,POPs, PAHs, were greater in Delhi, Bombay, Chennai, Ahmedabad than other cities in India. Perfloro alkyl substances , perfloroalkyl carboxylic acids and perfloroalkyl sulphonic acids were greater in Non vegetarian human hairs than vegetarians. Similarly 35 to 50 age group human hair having greater values of these emerging chemicals followed by 20 to 35, below 20 and above 50 age group human hair respectively, Human hair of Southern states have more emerging pollutants followed by Eastern ,Western and Northern states . Bisphenol compounds were greater in Yamuna River,Delhi, Chooms River ,Tamilnadu and Mulla Mathur river in Maharashtra than other rivers studied. Bispheol A is predominant in India while Bisphenol F & S were higher in Korea, Chain and Japan study areas. **The Research Projects were funded by Climate Change Department ,Gandhinagar and International Collaborative Project from AIST , Japan**

5. **Introduced GREEN AUDIT CELL ,CVM, worked** as a Coordinator from 2018 onwards for academic institutes (audited 120 institutes in three Phases) for Environmental and Sustainable, Clean, Green Practices and ambience in educational institutions and campus which is first of its kind in Gujarat state *http://greenaudit.ecvm.net/TEAM.html* **in collaboration with Gujarat Cleaner**

Production Center, GCPC , Gandhinagar. Huge impact was noticed in all green audited institutions-development of green campus with tree population and diversity, proper waste management systems -liquid,solid, air, rain water harvesting, installations of water meters, renewable energy systems, use of E-/CNG vehicles,biofuel,biogas by students and staff, ban on plastic, proper E-waste disposal, providing physical amenities for disabled (Divyangion) friendly, sensitize students and staff about Environmental concerns, climate change and mitigation measures (Recipient of Appreciation Award from GCPC, Gandhinagar)

6. **Environmental Education Awareness programs**-International, National, State level seminars, symposium, workshops, Summer Training, Industrial and Field Visits conducted which certainly improved awareness, exchange of latest developments on Environmental conservation and sustainable development, restoration, pollution-challenges, abatement and degradation, sharing the knowledge,latest developments among the learned, experienced and expertise scientific communities, students, stakeholders, government officers and local communities. Inculcated Environmental awareness and cultivated consciousness among UG , PG and Ph. D students every year in inter-collegiate competitions like poster competition, on the spot painting competitions, Essay writing competition, guest lectures, poster making competition, extempore competitions, oratory competitions during the celebrations of World or National days like World wetland day,National Science days,world wildlife day, world water day, World Earth day,World Environmental day, World Blood Donor day. World ozone day, National Wildlife week . Winners were rewarded with Prizes and certificates to encourage more and more participation , awareness.

AS A Counselor : I have delivered number of career development and counselling programs every year from 2015 during February and March to B,Sc and M.Sc students in different departments of V.P.Science College, N.V.Patel college of Pure and Applied Sciences, Bhadran and Petlad Science Colleges, Various departments Botany, Geology,Geography of M.S.University, Baroda about Culture, nature, aims, goals, preparation for exams, ethics, future prospects , Job opportunities etc.

7. **MoUs-International and National collaborations:** Developed international joint research collaborations with Dr. Nobuyoshi Yamashita, Chief senior Research Scientist, National Institute of Advanced Industrial Science and Technology

(AIST), Tsukuba, Japan, May, 2016 . Two of my Ph.D students pursued cutting edge of research work on Emerging Pollutants for three years in Japan with free of cost with grant of 75,00,00 per three years .Developed joint venture program with Prof.Daniel Oerther , Chair, Department of Architectural and Environmental Engineering, Missouri University of Science and Technology, Missouri, USA, for students and faculty exchange (MoU) program from 11th January, 2013. Developed joint venture program with Department of Civil and Environmental Engineering, University of Cincinnati, Cincinnati, Ohio, USA, on 24th December,2008 for the academic and research benefits of M.Sc and Ph.D Environmental students.www.nirmalkumarji.in/International.html, www.nirmalkumarji.in/MoU.html, www.nirmalkumarji.in/Press.html

Dr. Nirmal made MoUs-National collaborations with Nandesari Industrial Association, Green Group of Industries , Baroda, Gujarat Institute of Desert Ecology (GUIDE), Gujarat Ecological commission (GEC), Climate Change Department, Gandhinagar, Foundation for Ecological security (FES),Vidyanagar Nature club(VNC) for academic, placement, research and training for P.G and Ph.D Environmental Science students.

International Abroad Visits to discuss on various Environmental sustainable issues,challenges, opportunities & concerns with eminent scientists by Dr.Nirmal Kumar J:

a. Presented a paper, entitled "Biomonitoring of selected freshwater macrophytes to assess lake trace element contamination: A case study of Nalsarovar Bird Sanctuary, Gujarat, India" in International conference on Environmental Science and Technology, at Houston, Texas, USA, 19-22 August, 2006.
b. Visited and work shop on Phyto-remediation in Department of Earth and Environmental Sciences, University of Texas at San Antonio, Texas, USA, 23-25 August, 2006.
c. Presented a paper entitled "Anthropogenic interventions of Nal -Sarovar Bird Sanctuary, Gujarat, India" in International symposium on Wetlands 2006 at Acme, University of Michigan, Michigan, USA from 28-31 August, 2006 USA,
d. Visited Prof. Daniel Oerther , university of Cincinnati, Cincinnati, Ohio State, USA from 3rd to 5th October,2007 and attended meeting on 'Nano-Pollution and Toxicology' and joint venture dealing with the Department of Environmental Science and Engineering for students and teacher exchange program.

e. Visited North Carolina A&T State University, at Greensboro and Raleigh, USA for departmental collaborations as well as constructed wetland fields from 8-10th October, 2007.

f. Visited Prof. Daniel Oerther , Chair, and delivered a lecture in Environmental Research Center, Missouri University of Science and Technology, Rolla, MO, USA from 23rd October to 06th November, 2011.

g. Visited and interacted with Dr. Prasada Rao, Sr. Scientist, observed state-of-art facilities on toxicology US Environmental Protection Agency USEPA, Raleigh-Durham, NC, USA from 7th and 8th Nov.2011.

h. Visited and interacted with Prof. Susan Jennings, Director, Department of Sustainable Development, Massachusetts University, Dartmouth, Boston, USA on 9th Nov.2011.

i. Visited Dr. Nobuyoshi Yamashita, Chair, and developed international joint venture research collaboration with National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan with Dr. Nobuyoshi Yamashita from 8th to 15th May,2016.

I have visited Prof.Dr.Dibyandu Sarkar, University of Texas, San Antonio, Prof. Carol Rice, North Carolina A&T State University at Greensboro, Dr.Prasada Rao USEPA Raleigh-Durham, NC, Dr.Susan Genning, Department of Sustainable Development, Massachusetts University, Dartmouth, Boston, Prof. Smith David Acme, University of Michigan, Michigan, USA, Dr.Nobuyoshi Yamashita, Chief Chair, National Institute of Advanced Industrial Science Technology, Dr.XinhongWang Ibaraki, Agriculture University, Tokyo, Japan to discuss on advances,crosscutting facets, MoUs of Environmental Sciences **www.nirmalkumarji.in/International.html, www.nirmalkumarji.in/MoU.html.**

8. **Campus placements:** Every year campus placement drives have been conducted to M.Sc IV semester students compulsorily in TWO ways A. **On-campus interviews:** Initially letters were sent to selected industries, consultancies in Ahmedabad, Rajkot, Baroda, Surat Bharuch, Bhavnagar, Jamnagar etc in Gujarat. The company HRD / officers various industries or consultancies visit department and conduct personal oral interviews, group discussions, written tests as per their required vacancies in a defined date.

B. **Off campus interviews** : If ,industries or consultancies people could not come in defined date ,industries or consultancies ask us to send the students along with recommendation letters who were taken on conducting oral interviews at their end . All most all students were placed at the end of fourth semester either On campus or Off

campus interviews. Many students also migrate to foreign countries like US,UK, Canada, Australia etc for higher studies and job .

C. **Instrumentation Training , Summer internship and Industrial Project work :** All students were sent to Instrumentation training in Sophisticated Instrumentation Center for Applied Research and Testing - SICART Vallabh Vidyanagar on GC MS, ICPA analyser, HPTLC, FTIR for three days at end of every 4th semester since 2007. Summer Internship to be arranged to all students at the end of 2nd semester during vacation. Project work is compulsorily to each student where students are given research projects related to Environmental Science and Technology and work in industry or consultancies or in EST lab ISTAR,thereafter students have to submit thesis and undergo viva- voce by University examiners .

D. **9.During my tenure as a Principal** (2017 to 2021) ISTAR , ISTAR achieved Top 1st Rank College among all colleges (2021) and Top 1st Rank college among Engineering and Technology institutes (2020) first time in Gujarat and Top 3rd rank college among all colleges (2019) in Gujarat,in GSIRF ranking, Govt. of Gujarat. Besides, first time ISTAR ranked between 101 to 150 and 151 to 200 rank among all colleges in India during 2020 and 2021, respectively, in NIRF ranking at National level, only three colleges from the Gujarat.

Besides, Dr. Nirmal has worked as Coordinator for Research and Consultancy III criteria of NAAC and achieved “A” grade from 2014-2019 at ISTAR.

During my academic carrier, I was instrumental in starting B.Sc and M.Sc programs in Environmental Science in 1997 and 1999 from Sardar Patel University first time in Gujarat, and first recognize Ph.D guide in Environmental Science (2002), produced young Students of B,Sc, M.Sc and Ph.D who are flourishing, thriving in Environmental Sectors not only in India but also in Overseas **.**

10.Voluntarily served philanthropic work to the underprivileged ,poor ,needy and deprived people of the society by providing the scholarships -Methodist Church , Anand , Gujarat.Financial assistance, cloths, medicine and food regularly provided to Popatbhai Charitable Foundation, National Association for Blind, Old- age home,Anand, P. J Stephen Paul Ministries since 2000, Hyderabad. Conducted social activities like plantation programs, clean and green activities, Covid-19 Vaccination camps, lectures related to animal husbandry, human health issues, cancer, Cattle camps, crop and diseases control,use of pesticides- prose and cons, body check-up,eye check-up camps,blood

donation camps to village peoples since 2017 in Adopted Villages Lambvel and Samarcha **(www.nirmalkumarji.in/helping.html).**

On retirement, I am working as a member in Lions club International , Vittal Udhognagar and Voluntary Nature Club VNC Vallabh Vidyanagar and focus to improve clean and green environment in Industrial area as well as Townships Anand and Vallabh Vidyanagar by Plantation Programs, Distribution of Plants to citizens to combat climate change consequences, global warming and green house effects, Blood donation camps, Distribution of Umbrellas to road side vendors , food distribution to poor and needy in Government primary schools, TB Kits distribution etc and all these activities certainly provide boon to local peoples as well as communities.

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Websites/ links : http://greenaudit.ecvm.net

http://www.nirmalkumarji.in/press.html,

http://greenaudit.ecvm.net/TEAM.html

https://vidwan.inflibnet.ac.in/profile/270934

https://scholar.google.co.in/citations?user=upm4FnsAAAAJ&hl=en