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The Contributions of South Asian Jesuits to Environmental Work

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Abstract

Almost from the moment they arrived there in 1542, Jesuits in India and Sri Lanka have made substantial contributions to the scientific disciplines. In the initial stages they were not directly involved in environmental works, but in recent years many are taking the initiative to work for environmental justice. Some Jesuits are involved in raising awareness on environmental issues, such as promoting reforestation and watershed programs, whereas others work to provide safe drinking water or to prevent tree-felling, while others study local biodiversity and are creating and maintaining botanical gardens. Other environmental projects include the promotion of solar energy, biopesticides and biofertilizers for organic farming, the micropropagation of rare, endangered, and threatened (RETS) plant species (so that they may be replanted in greater numbers), the formation of local centers and eco clubs where students and

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others can collaborate for a healthier environment. Several Jesuits are also active politically assuming advocacy roles, and writing books and research articles in the interest of environmental conservation. A select few Jesuits are even recognized on a national level for their contributions to environmental causes.

Keywords

South Asia – biodiversity – flora – botany – watershed – environmental awareness – biopesticide – micropropagation – Tarumitra – plant tissue culture

Introduction

The Jesuit presence in India began soon after the beginnings of the Society of Jesus itself (1540). Starting with Francis Xavier (1506–52), who landed in Goa on May 6, 1542, a host of Jesuits arrived in India and worked for the general welfare of the Indian people, along with the promotion of the faith. In Xavier's wake, numerous missions, including those of Bengal, Malabar, and Madura were initiated and endured until the 1773 suppression, which created a void of Jesuit activity in India. Upon the Society's eventual restoration in 1814, many Jesuits again traveled to India and Sri Lanka establishing new missions in various regions while recruiting natives into the Society, a step that fostered the community's growth and, in time, necessitated the division of missions into different provinces for administrative purposes.¹ As part of this process, the Indian Jesuits established a large number of schools (more than 150) and colleges (more than fifty-two), through which they have been able to reach millions of students over the years. These institutions effectively became the venues where greater environmental awareness and ecological activities related to environmental justice can now occur.

Even though initially the environment was not directly the object of the Jesuits' efforts, several individuals nevertheless were intimately associated with their environs. For many early Jesuits, environmental involvement was more of an extramural activity than their principal occupation. Still the contributions of these individuals left an indelible mark. Considerable, well-documented

1 John Correia-Afonso, "A History of the Society of Jesus in India," in *Jesuit Presence in Indian History*, ed. Anand Amaladass (Anand: Gujarat Sahitya Prakash, 1988), 3–13.

data exists to show that their works embraced the holistic development and progress of the Indian people.² For example, the Jesuits Anthony Gabelberger (1704–41), Andrew Strobl (1703–52), Joseph Tiefenthaler (1710–85), and Francis Xavier Wendell (1803–75) contributed enormously to the development of astronomy in India.³ Eugene Lafont, S.J. (1837–1908), instrumental in founding the Indian Association for the Cultivation of Science in Calcutta, made significant contributions to the field of physics. The Spanish archeologist and historian, Henry Heras, S.J. (1885–1955), was widely acknowledged in India as a pioneer in cultural studies—a 1981 Indian postage stamp with his likeness demonstrates his influence. In a similar vein, the Calcutta-based Indian Chemical Society established a biennial lecture and an award that is the namesake of Lourdu M. Yeddanapalli, S.J. (1904–70), a pioneer in physical chemistry.

However, in recent times, Jesuits are being called to show ever more effective and explicit ecological solidarity in their spiritual, communitarian, and apostolic lives. This vocation, moreover, conditioned as it is in this current climate, seems to signal that a renewed covenant with creation would be a basic component of a right relationship with God, and with one another.⁴ Based on these promptings, many younger Jesuits have taken up various kinds of activities related to environment. Earlier Leo D'Souza (b.1932) wrote an article on the Jesuit contribution to environmental protection.⁵ This article, however, differs from mine in its approach and coverage, serving as a catalyst for the Society in the promotion of environmental sensibility. Comparatively, as a possible resource for such prospects, I shall try in this article to give a general overview of the environmental contributions of the Jesuits in India and Sri Lanka over the course of its entire history. For the sake of convenience, having provided a precise introduction of each province's history, I shall take account of the individual contributions by Jesuits according to the various provinces in the South Asia Jesuit Conference, which are displayed in alphabetical order below.

2 Job Kozhamthadam, "Jesuit Contribution to Science in India," *Vidyajyoti Journal of Theological Reflection* 68 (2004): 892–916.

3 See Dhruv Raina, "French Jesuit Scientists in India: Historical Astronomy in the Discourse on India, 1670–1770," *Economic and Political Weekly* 34, no. 5 (1999): 30–8.

4 *Decrees of General Congregation* 35 (Anand: Gujarat Sahitya Prakash, 2008), 79.

5 See Leo D'Souza, S.J., "Jesuit Contribution to Environmental Protection," (<http://www.sjweb.info/sjs/networks/ecology/Indian%20Jesuits%20Contribution%20to%20Environmental%20Protection.pdf> (accessed June 22, 2016)).

Andhra Province

The geographical state of Andhra Pradesh was historically part of the apostolic works of the Jesuit Madurai province. In 1972, it was recognized as a dependent region of the Madurai province and in 1988 was established as a province.

Sebastian Emmanuel, S.J. (b.1955), for one, wrote a book in the local language of Telugu on environmental analysis.⁶ In collaboration with student groups, he raised awareness of pollution, deforestation, and sustainable farming, while creating a garden that emphasizes biodiversity with 450 rare species, as well as an herbal garden with one hundred medicinal plants. Presently at the All India Catholic University Federation (AICUF), he is undertaking important environmental justice activities and promoting fuller participation in environmental efforts. As the editor of *The Rally*, the AICUF's monthly periodical, he selects an environmental topic (such as water, land, or biodiversity) to encourage his nationwide readership to strive towards a better environment.

T. Amal Arockiaraj, S.J. (b.1960), as principal of Loyola Raja Reddy College, a Jesuit school in Puliventhala, initiated a program that planted more than ten thousand saplings on a dry hillock that is property of the college. While the basic aim of this project was to motivate young students towards undertaking their own environmental works, it transformed this terrain into a unique landscape with a wide variety of plant species.

Bombay Province

Established in 1853, the Bombay mission founded the city's St. Xavier's College in 1869. By 1892, the mission was entrusted to the Spanish Jesuits of the Aragon province, and then to the Jesuits of the Tarragona province (Spain). Bombay eventually became an independent vice-province in 1953, and a separate province three years thereafter.

Ethelbert Blatter, S.J. (1877–1934), arriving in India in 1903, served as a professor of biology at St. Xavier's College, where he began his vast collection of botanical materials—much of which is still preserved for future generations in the Blatter Herbarium that is located at the college. Keenly interested in natural history and environmental concerns, Blatter studied and published extensively on mangroves, ferns, mosses, grasses, and the many other varieties of flora of the Bombay Presidency—an administrative subdivision of British

6 Sebastian Emmanuel, S.J., *Periavaruna Vishleshana* [Environmental analysis] (Vijayawada: Andhra Jesuit Social Action, 1993).

India—and was constantly in search of new species, especially in the Western Ghats. His work was foundational for the research and career of his protégé Hermenegild Santapau, S.J. (1903–70), who pursued this line of scientific research (see below). Traveling widely to various regions of India, Blatter examined the flora of the Indian desert, in both Jodhpur and Jaisalmer, and the flora of the Indus Delta, as well as the orchids of the *Meghamalai* (மேகமலை, High Wavy Mountains) in the Madurai district, the flowers of Kashmir, and varieties of flora in Coimbatore and Ceylon. His botanical curiosity extended to the history of the sea coconut, the date palm, and Indian bamboo, and also beyond India to the flora of Aden, Baluchistan, Basra, Mesopotamia, and Waziristan.⁷

Jean Ferdinand Caius, S.J. (1877–1944), a graduate of Paris's *École de Médecine*, was appointed in 1924 to a government research position at the Haffkine Institute, Mumbai, after having worked in St. Joseph's College, Tiruchirappalli, and St. Xavier's College, Mumbai. Also a member of the Indian Drugs Inquiry Committee of the Bombay Chemical Society, the Bombay Natural History Society, and the faculty of medicine of the University of Bombay, his roughly 150 research papers are published on a wide range of interests, including: Indian medicinal plants, poisonous reptiles, the venom of scorpions, anti-venomous serums, the bacterial action of phenols, and organic compounds of mercury. Fascinated by Indian practices of earth-eating and salt-licking, he also conducted extensive studies of the medicinal and poisonous varieties of the subcontinent's palms, sedges, ferns, grasses, orchids, aroids, campions, crowfoots, spurges, and crucifers, as well as medicinal and poisonous plants, such as mangoliads, dilleniads, anonads, menispermads, and water-lilies.⁸

The Spanish-born Hermenegild Santapau landed in India in 1928, having completed a second doctorate in botany at the University of London and undertaken botanical explorations in the eastern Pyrenees and the Italian Alps. His doctoral studies also included valuable work experience at the Royal Botanical Gardens, Kew and Surrey, UK. During his thirty-year tenure at St. Xavier's College, Mumbai, between 1940 and 1970, he carried out research projects in Balochistan, Kathiawar, and the Dangs Forest, exploring the mountain ranges of the Western Ghats, the Eastern Ghats, the Eastern Himalayas, in addition to the districts of Assam, Darjeeling, Dehradun, and Mussoorie. Appointed director of the Botanical Survey of India (in office, 1961–68), he received the Padma

7 See, e.g., Ethelbert Blatter, *The Palms of British India and Ceylon* (London: H. Milford, 1926).

8 For a small sample of his publications, see Jean Ferdinand Caius and Krishnaji Shripat Mhaskar, *Indian Plant Remedies Used in Snake-Bite* (Calcutta: Thacker, Spink and Co., 1931); Caius, *The Medicinal and Poisonous Plants of India* (Jodhpur: Scientific Publishers, 1986; reprint). Caius was also a collaborator of Blatter, his fellow Jesuit in Bombay.

Shri, one of the highest civilian awards, from the Indian government and the ceremonial cross from Spain's Orden de Alfonso X el Sabio. He published numerous papers related to systematic botany, and his book on flora of Khandala was highly acclaimed, as were several other scholarly works of his.⁹

Calcutta Province

In 1574, the Jesuits reached Bengal, commencing apostolic works such as pastoral care, teaching, and vocational training in various locales. The Bengal mission was formally established in 1834, and in 1956 Calcutta was made a vice-province that included two independent regions, Darjeeling and Santhal Parganas. A separate province of Calcutta was established in 1976.

Xavier Savarimuthu, S.J. (b.1971), with a doctorate in environmental science, specializes in the health impacts of arsenic pollution in West Bengal. He is also the driving force behind the Global Earth Summit in St. Xavier's College, Kolkata, an educational initiative that aims to create a platform from which students can interact with experts of international stature from the field of environmental studies. The primary objectives of this project are the dissemination of information, the general creation of environmental awareness, and—according to an Ignatian model of education—igniting young minds through an ecological framework that strives toward the ideal of sustainable living and environmental justice. Savarimuthu published numerous articles with a research focus on water-related issues, such as sanitation, grassroots dug-well programs that might provide arsenic-free water to impoverished villagers in arsenic-affected districts.¹⁰ On a social level, his advocacy highlights the environmental dimension of the dual vices of instant gratification and conspicuous consumption that are currently permeating Indian culture, and he is seeking in his mission to spread environmental awareness through formal education

9 See Hermenegild Santapau, S.J., *The Flora of Khandala on the Western Ghats of India* (Delhi: Botanical Survey of India, 1967); Santapau, *Flora of Purandhar, or an Enumeration of All Phanerogamic Plants Discovered in Purandhar during the Years 1944–1956* (New Delhi: Oxford Book and Stationery Co., 1957); Santapau, ed., *The Flora of Saurashtra*, vol. 1: *Ranunculaceae to rubiaceae* (Rajkot: Saurashtra Research Society, 1962); Hermenegild Santapau, S.J., and Z. Kapadia, *The Orchids of Bombay* (Delhi: Government of India Press, 1966), which was a revision of the junior author's PhD dissertation under the direction of Santapau.

10 See, e.g., Xavier Savarimuthu, S.J., et al., "Seasonal Variation of Arsenic Concentrations in Tubewells in West Bengal, India," *Journal of Health, Population and Nutrition* 24, no. 3 (2006): 277–81.

and, specifically, by informing his students about potential ways to mitigate environmental depredation.

Dumka Province

Created in 1989, Dumka Province developed out of the Calcutta Province.

P. A. Chacko, S.J. (b.1954), along with other Jesuits in his province, took steps to expose tribal and indigenous students to their own immediate environs, especially the hills and forest canopy, through classes, dramas, environmental readings, and direct experience. As an outcome of this programming, students began to recite songs about the environment, and to take up various creative projects such as writing an autobiography of a stream, a plant, a butterfly—to name some examples. Additionally he facilitated the creation of a students' association, the Environmental Protection Group, to protect the forests from further devastation; in fact, as a result of this program, not a single tree appears to have been felled since its founding. Acting in the public interest for environmental justice and promoting the survival of the area's indigent population, these students collaborated with the regional governing authorities in order to preserve several tracts of forest. As a result, they played an instrumental role in prohibiting illegal stone and coal mining, and thus in limiting the wanton destruction of the local forests, which are a valuable economic and cultural resource. The actions of these students may provide an example and an inspiration for other victims of environmental exploitation.

As a doctoral student, Varghese Palli, S.J. (b.1954), studied the moths of Rajmahal Hills in Jharkhand as an "indicator species" of environmental health. Currently, along with many younger Jesuits, he is conducting a tree planting program and is developing a curriculum of environmental awareness.

Goa Province

Until 1992, Goa Province belonged to the composite Goa-Pune Province, before finally becoming its own independent region, and then the following year, in 1993, a province.

Pratap Naik, S.J. (b.1951), established a small botanical garden at Porvorim that contained fruit trees and flower-bearing plants and trees, mostly native to Goa.¹¹ The leading Goanese television network, Doordarshan, broadcast two

¹¹ Each flower in this botanical garden is accordingly assigned an identifying nameplate in the local language, Konknni, as well as its popular name in English, and the formal

documentary programs that disseminated further information about the garden to the public.¹² On March 30, 2008, the Botanical Society of Goa awarded this garden, under the category of private gardens, and the well-known journalist Frederick Noronha named Pratap Naik himself as “a priest with green fingers,” which brought wider publicity to his preservation efforts. Birds, both local and migratory, apparently consider the garden as a kind of refuge for rest and breeding.

At the Pedro Arrupe Institute of Raia, around 2000, Savio Rodrigues, S.J. (b.1941), began an initiative to plant a variety of fruit-bearing trees, and several decorative outdoor and indoor plants as a demonstration for students, especially promoting the benefits of tree canopies and the provision of healthy fruits.

Joseph Chenakala, S.J. (b.1947), promotes watershed programs in order to preserve rain water, while also building in various villages hundreds of “gobar” gas plants—a kind of biogas and a renewable resource—that can provide an alternative-energy solution for cooking. He concurrently conducts environmental awareness programs and courses for the village leaders.

Gujarat Province

The Gujarat province was established in 1956, after having been officially subordinated to the Bombay mission. Around the 1970s, the Jesuits initiated watershed programs in several parts of Gujarat, promoting “alternative technologies” and setting up solar cookers at several places. In 1977, José M. Heredero, S.J. (b.1929), established the Behavioural Science Center in Ahmedabad, subsequently pioneering an approach of “social forestry” amongst the Vankars and Dalits in the Khambhat area of Gujarat.¹³ As a result of this campaign, in 1988 he was rewarded with the Indira Priyadarshini Vrikshamitra award, which is granted by the Ministry of Environments and Forests, New Delhi.

Vincent Braganza, S.J. (b.1950), instrumental as the director of the Loyola Centre for Research and Development, assisted in developing an ecological

scientific name. It has become a popular site for field tours from local colleges that provide programs specializing in botany.

12 Goa Doordharsan telecast on June 23, 2005.

13 See José M. Heredero, S.J., *Rural Development and Social Change: An Experiment in Non-formal Education* (Columbia, MO: South Asian Books, 1977); Heredero, *Education for Development: Social Awareness, Organisation, and Technological Innovation* (New Delhi: Manohar, 1989). See also Joseph Valiamangalam S.J., “History of Jesuits in Gujarat,” at sites.google.com/a/jesuits.net/websites-blogs-of-gujarat-jesuits-insitutions/history-of-gujarat (accessed June 22, 2016).

niche on the campus of St. Xavier's College (Ahmedabad) in collaboration with the Xavier Research Foundation. In particular, his office oversees and examines the nearly one thousand plant species of ethnomedicinal, medicinal, and economic importance that comprise the college's botanical garden. Enacting an environmental objective, this collaboration provides source material for plant tissue culture as a repertoire of techniques for conserving, propagating and promoting several threatened species of plants, particularly those with medicinal potential. This ecological project also carried out research related to chromium-exposed populations, biodiesel production, and the utilization of thermophilic bacteria for industrial effluent treatment.¹⁴

Rappai Poothokaren, S.J. (b.1944), undertook the initiative to set up Tarumitra Gujarat in 2002 with St. Xavier's College and Gurjarvani, a Jesuit communication and culture center at Ahmedabad, with three other committed secular nongovernmental agencies (NGOs), working with students to spread environmental awareness, advocacy and action.¹⁵

Jolly Nadukudiyil, S.J. (b.1957), transformed acres of saline land at Katamba Farm, near Vadodara, into a lush green expanse as a result of planting roughly 50,000 trees. The Jesuit-managed Xavier Technical Institute in Sevasi, Vadodara, trains solar technicians and spreads the use of solar energy for lighting, cooking, hot water, drying, and preserving agricultural products. The Xavier Institute of Technology at Linch, near Mehsana, is also engaged in promoting environment-friendly technology, specifically solar energy.

Engaged in the field of medicinal plants, and specifically in the tribal belt of South Gujarat, Lancelot D'Cruz, S.J. (b.1961), launched the Aadi Aushadhi Group ("Original medicine") in collaboration with NGOs that specialize in Adivasi herbal medicinal practices, documenting Adivasi medicinal knowledge, plantation of medicinal herbs, as well as their production and use. Based on this initiative, the Gujarat state government signed the first access benefit sharing agreement under the Gujarat Biodiversity Act with Aadi Aushadhi. This project, furthermore, is preparing seventeen equivalent program under the rubric of the People's Biodiversity Registers, based on the model of Aadi

14 See D'Souza, "Jesuit Contribution to Environmental Protection."

15 Tarumitra, meaning in Hindi "friends of the trees," is a student movement with the expressed purpose to promote and protect the environment. For further information, see Tarumitra, <http://tarumitra.org/> (accessed June 14, 2016). For other examples of Indian Jesuits involved in this national campaign, see below the works of the Patna province, specifically Thayil, Parekattil, Athickal. In the late 1980s, Robert Athickal, S.J., was the first to grant land in Patna to this ecological project. It has since spread throughout India, and through its collaborative, organizational plan it is enmeshed with local communities around specific environmental issues.

Aushadhi, which currently operates thirty-five biodiversity monitoring committees and oversees 108 villages in the area.¹⁶

Furthermore, this province is at the forefront of ecological consciousness in India recognizing ecology as a key aspect of its apostolic mission. This is evident through Gujarat Jesuit Ecology Mission (GJEM), its recent eco-venture that was formed in 2010 after the Thirty-Fifth General Congregation. One other manifestation of this new direction, in terms of Jesuit spirituality, is the “Ignatian Eco Retreat,” in which more than sixty Jesuits participated. According to its organizers, Poothokaren, S.J., and Robert Athickal, S.J. (b.1953), this event fostered a spiritual communion with “the Lord of creation” that was rooted in the *Spiritual Exercises* of Saint Ignatius.¹⁷ Eco-Sundays are also designated as a special occasion at several parishes throughout the province.

Additionally, the GJEM project helped organize and network the province around ecological themes and topics. For instance, the forum brought St. Joseph High School (Vadodara), St. Xavier’s College (Ahmedabad), and Xavier Technical Institute (Sevasi) into correspondence regarding environmental activities and subsequently particular benchmarks for the province. These academic venues also enabled GJEM to establish a certificate course in ecology, and facilitated Aadi Aushadhi’s organizational goals of integrating medicinal plant cultivation with vermicomposting—techniques that are especially successful with women’s groups and in indigenous communities. As another example of its operation, GJEM assists in the development of a plot in Sevasi that is being cultivated as an experimental organic farm—an extraordinary goal in this region.

Hazaribagh Province

Originally belonging to the Ranchi Province, the Hazaribagh mission commenced in 1950, and in 1957 was declared a region, which was dependent upon Ranchi. In 1992, it was formally elevated to the status of a province.

16 Aadi Aushadhi Group, <http://aadiaushadhi.com/> (accessed June 14, 2016). See also Lancelot D’Cruz, S.J., “Traditional Knowledge and NTFP Utilization: The Aadi Aushadhi Model,” *Biodiversity Watch* 1 (2013): 71–8, http://www.biodiversity-watch.com/issue/Biodiversity_Watch_issue_1.pdf (accessed June 14, 2016). This has been a topic of interest since his doctoral work, see D’Cruz, “Phytochemical and Biochemical Studies of Some Ethnomedicinal Plants of Dediapada Forest” (PhD diss., Gujarat University, 2002).

17 See Rappai Poothokaren, S.J., and Robert Athickal, S.J., “Ignatian Eco-retreat,” *Ecojesuit*, December 15, 2012, <http://www.ecojesuit.com/ignatian-eco-retreat/4521/> (accessed June 14, 2016).

Saju Bastian, S.J. (b.1962), is involved in tree plantation and watershed programs that aim to improve water levels, and is also involved in teaching environmental spirituality and tribal eco-experiences. He cultivated in many younger Jesuits an ecological consciousness, particularly in nature's creative and transformative processes. According to his pedagogical approach, the tangible presence of God in creation is the bedrock of experiencing the Divine. He also writes popular articles to create general awareness about environmental issues.

As part of its social apostolate, several Jesuits from Hazaribagh province are engaged in advocacy on behalf of approximately two hundred villages and twenty thousand families, who are disaffected by coal mining. This advocacy took place in close interaction at the grassroots level, encouraging and supporting those campaigns, and acting as an intermediary to facilitate such communities in making their voices heard at the political decision-making levels. This was done through fieldwork, as a means of information-gathering, in developing focused reports, and acting as a conduit with various governing authorities in order to initiate and perpetuate further dialogue.

Jamshedpur Province

Jamshedpur mission, carved out of the Ranchi mission and the Calcutta mission, was entrusted in 1947 to the Maryland Province (USA), and eventually became an independent province in 1983. In this province, Jesuits have contributed to the improvement of the environment by conducting awareness programs about deforestation and global warming. Additionally, every year six thousand fruit saplings and eight thousand non-timber saplings are distributed to communities, as local farmers are meanwhile trained in sustainable agriculture and horticulture. Jesuits in this province also provide training in watershed management.

Karnataka Province

The Mangalore mission, established in 1878 by annexing Mangalore and Malabar from the Verapoly diocese, was acknowledged in 1928 as the Calicut mission. In 1955, this mission became Mangalore vice-province, before in 1956 being renamed Karnataka vice-province, and ultimately in 1962 was established as a province.

Cecil Saldanha, S.J. (1926–2002), a well-known plant taxonomist and environmentalist, was a prodigious author on the botanical diversity of the Hassan

district in the Western Ghat area of Karnataka, and then more broadly the entire region of Karnataka. In the one volume about Hassan District, he reports on the 1,700 vascular plants in this area, with 132 original drawings, and twenty color plates.¹⁸ His two-volume work on the flora of Karnataka, according to two specialists who were writing on the occasion of his death, is the first survey of flora with keys, illustration, descriptions, nomenclatural citations and distribution notes from the state of Karnataka with over 3,400 species of flowering plants.¹⁹ Deeply involved in the emerging field of environmental studies, as Leo D'Souza observes, Saldanha was invited by the government of Karnataka to prepare the "Karnataka State of Environment Reports," in both English and Kannada, in the mid-1980s and for several years of the early 1990s; he also served as both a board member and chairperson on various environmental commissions at the state and the central government levels.²⁰ In addition to the multidisciplinary environmental impact studies, his full bibliography bestows many insights into biodiversity, and a variegated range of environmental issues.²¹

Leo D'Souza, S.J., a pioneer in plant tissue culture in India, developed protocols for the large-scale, in-vitro propagation of a variety of forest trees and medicinal plants. His efforts were related to the full recovery and wider accessibility of Ayurveda, the ancient Indian medicinal tradition that is a plant-based system of practice. Presently, the plants customarily used for medicinal

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- 18 Cecil J. Saldanha, S.J., and Dan H. Nicolson, eds., *The Flora of Hassan District* (New Delhi: Amerind, 1976).
- 19 Cecil J. Saldanha, S.J., *Flora of Karnataka*, vol. 1: "Magnoliaceae" to "Fabaceae" (New Delhi: Oxford and IBH Publishing, 1985); idem, *Flora of Karnataka*, vol. 2: "Podostemaceae" to "Apiaceae" (New Delhi: Oxford and IBH Publishing, 1996). See Dan H. Nicolson and Kanchi N. Gandhi, "Cecil John Saldanha (1926–2002)," *Taxon*, 51, no. 3 (2002): 585–87.
- 20 Leo D'Souza, S.J., "Indian Jesuit Contribution to Environmental Protection," paper presented at St. Aloysius, Mangalore, April 30, 2009, unpublished but available online at: <http://www.sjweb.info/sjs/networks/ecology/Indian%20Jesuits%20Contribution%20to%20Environmental%20Protection.pdf> (accessed June 14, 2016).
- 21 Ibid.; in particular see Cecil J. Saldanha, S.J., and Jyotsna Dhawan, *Plants of India* (New Delhi: Oxford and IBH Publishing, 1984), which is especially revealing of the flora of the Western Ghats, a topic that he had previously explored in great detail; Cecil J. Saldanha, *Endemic Angiosperms in the Western Ghats* (Bangalore: Centre for Taxonomic Studies, St. Joseph's College, 1995); Saldanha, ed., *A Select Bibliography for Andaman and Nicobar Islands for Environmental Impact Assessment*, 2 vols. (Bangalore: Centre for Taxonomic Studies, St. Joseph's College, 1988–90); Saldanha, ed., *A Select Bibliography on the Environment of Karnataka* (Bangalore: Centre for Taxonomic Studies, St. Joseph's College, 1995); Saldanha, *Managing the Western Ghats* (Bangalore: Centre for Taxonomic Studies, St. Joseph's College, 2001).

purposes are dwindling in quantity, and some are no longer available on account of habitat destruction. Along with others, D'Souza studied the effects of large-scale deforestation on soil, flora, and fauna of Dakshina Kannada, a district of Karnataka state. This team also studied the unfavorable effects of afforestation of non-native trees, which caused a considerable imbalance to local ecosystems. Furthermore, they studied the socio-economic effects of such ecological changes upon village life, especially regarding the occupations of persons who are dependent upon produce from the forest for their own work and livelihood. Accordingly, they are concentrating on the biodiversity of local varieties of rice, sugarcane, and finger millet by using molecular markers. In terms of renewable energy and resources, they are concurrently engaged in studying the possibilities of using plant waste as biofuels. D'Souza, in a grass-roots capacity, collaborates with local activists in order to protect and preserve the extant tracts of original flora in the Mangalore area by organizing protests and writing op-eds in the local newspapers, which are still the most popular media in the region.

Melwyn D'Cunha, S.J. (b.1970), is promoting conservation and the enrichment of soil through the use of special plants that are associated with fungi.

Kerala Province

Malabar region, established in 1956 and attached to Madurai Province as a dependent region, became a vice-province in 1960, and finally a province in 1983.

Joseph Pallithanam, S.J. (1915–84), collected more than 10,000 plant specimens with the idea of promoting biodiversity, and published approximately eighty research papers on the subject.²² Kumbalankal T. Chandu, S.J. (b.1946), with a doctorate in economics of environmental management for human survival, is closely involved in cultivating popular awareness about ecosystem and, generally speaking, ecology and the environment in the Indian public sphere. As the founder of the Department of Agriculture and Environmental Education at the Indian Social Institute, in New Delhi, and a popular voice for the cause of environmental justice, he has written 676 booklets about eighty topics that are related to subjects ranging from agriculture, animal husbandry forestry, fisheries, to aquaculture. He is also a critical theorist on environmental law.

²² See, e.g., Joseph Pallithanam, S.J., and Koyapillil Mathai Mathew, S.J., *A Pocket Flora of the Sirumalai Hills, South India* (Tiruchirappalli: Rapinat Herbarium, St. Joseph's College, 2001).

As part of their efforts in developing a holistic approach for this context, the Jesuits from Kerala province are presently establishing Sahajeevanam, a center whose mission is the cultivating environmental awareness and sustainable growth in society. Its principal objective is mobilizing popular participation in projects of environmental preservation, while interrelating such conservation campaigns social justices advocacy, particularly on behalf of the poor. In collaboration with various satellite programs, that include research centers—specializing on topics that range from alternative energy, natural farming, solar engineering, and eco-spirituality—and holistic healing centers—integrating ayurvedic, homeopathic, and naturopathic perspectives—these centers aim to recapture the remnants of deep-rooted traditions and cultures.

Madhya Pradesh

Madhya Pradesh Province, originated in 1992, was a part of Ranchi Province. It represents many districts with tribal and indigenous communities, who live in intimate association with their environs. In this province, the Jesuits impart environmental knowledge to students at their schools and colleges, and through regular meetings. Annual plantation festivals are organized, and watershed programs are also promoted for the conservation of water.

Madurai Province

The Madurai mission was entrusted to the care of Toulouse province (France), until it was elevated to the status of vice-province in 1927, and then recognized as a province in 1952.

As early as 1877, the Jesuits of Madurai were cultivating botanical gardens due to the unique gifts of Pierre Labarthere, S.J. (1831–1904). Subsequently, others, such as John Mallat, S.J. (1862–1922), Francis Bertram, S.J. (1870–1936), Emile Gombert, S.J. (1866–1948), Louis Anglade, S.J. (1873–1953), George Foreau, S.J. (1889–1959), and Alfred Rapinat, S.J. (1892–1959), played influential roles in protecting the environment and promoting the study of ecology at Shembaganur's Sacred Heart College, in the Kodaikanal district of Tamil Nadu, a place renowned for its flowers.²³ Mallat, for instance, was interested in the

23 Koyapillil Mathai Mathew, "Natural History Contributions of Madurai Jesuits," in *Jesuit Presence in Indian History*, ed. Anand Amaladass (Anand: Gujarat Sahitya Prakash, 1988), 249–74.

biodiversity of insects, and subsequently collected many that would be kept in the museum at Sacred Heart College and at St. Joseph's College museum, in Tiruchirapalli. Bertram, on the other hand, was interested in beekeeping, gardening, tree planting and conservation, whereas Gombert collected orchid plants and eventually established a garden that was exclusively dedicated to these flora at Sacred Heart College. Anglade oversaw a vast and thoroughgoing collection of plants, which he documented through paintings—as Gombert had done with his orchids. He designed 1,910 plates, which were bound in ten volumes, and also collected three hundred kinds of timbers. This quest to understand the region's biodiversity is also evident in the museum institution that he established at Sacred Heart College. Foreau, meanwhile, assembled a collection of mosses, lichens, algae, and fungi, with nearly 424 species of moss having been collected by him alone.²⁴ Rapinat, for his part, collected many flowering plants, lichens, ferns, and mosses, and was a reputable physiologist as well. There is also a prominent herbarium that bears his name, as will be discussed below.

Following in the footsteps of earlier Jesuits, many contemporary Jesuits continue to contribute much in various environmental fields. Koyapillil Mathai (K. M.) Mathew, S.J. (1930–2004), for example, studied the floral diversity of Tamil Nadu, and exemplified the ethos that creation is where God is revealed. He is an integral figure in the history of Madurai Jesuits, connecting with those predecessors while building a legacy of his own through higher education. In 1967, he established at St. Joseph's College the Rapinat Herbarium—the namesake of his fellow Jesuit who had passed in 1959—and later, in 1984, the Anglade Institute of Natural History, which served as the so-called “hill laboratory” at the Sacred Heart's Herbarium.²⁵ Mathew himself trained roughly 200,000 students at these centers, until the date of his passing. He also developed a program that consists of a three-day residential training based on demonstration and field trips that illustrate techniques of environmental conservation and sustainable development.

The Rapinat Herbarium alone houses thousands of plant specimens, and is acclaimed as the best plant taxonomic library in South India, and its research

24 George Foreau, *The Moss Flora of the Palni Hills* (Bombay: Bombay Natural History Society, 1961), 13–47.

25 The latter institution was, of course, also named after his fellow Jesuit, Louis Anglade, who had passed in 1953. See Koyapillil Mathai Mathew, *A Handbook of the Anglade Institute of Natural History, Shembaganur* (Shembaganur: Rapinat Herbarium, Sacred Heart College, 1987); Mathew, “My Scientific and Environmental Apostolate,” *Caritas* 83, no. 1 (1998): 24–37; John Akeroyo, “Father K. M. Mathew, Tireless Botanist and Environmental Teacher,” *Plant Talk* (2004): 7.

mission is still dedicated to a broad range of environmental topics.²⁶ Since 1972, the center's primary focus though is the flora of central Tamil Nadu, taking account of the indigenous botanical wealth and catering to the needs of both foresters and taxonomists. In its development, the herbarium expanded, in time, to encompass other regions within its orbit: the Palni Hills, in 1980; the Eastern Ghats, in the 1990s; and the Coromandel Coast, in 1997.²⁷ It was also part of Mathew's project to make biodiversity data, in the form of illustrated volumes on flora, available to the layman—so to speak—and so many of his publications are written for a general audience.²⁸ The national government's Department of Environment and Forests awarded K. M. Mathew with the Indira Gandhi Environmental Prize for his outstanding contribution to environmental protection; it served as a reward for his mission to inform as many people as possible about the plants that surround them and help them protect the environment.

His protégé, S. John Britto, S.J. (b.1946), is continuing this line of inquiry, while imparting environmental awareness and carrying out botanical research on environmental issues of popular interest.²⁹ Having written numerous research papers for specialists and several books, his first book *Flora of Tamil Nadu Carnatic* is regarded as an essential reference book.³⁰ Under the guidance of John Britto, the Rapinat Herbarium's research team has completed in 2010 the ethnobotanical documentation of Irula tribal groups and the Kuravas peoples of the Tiruvanamalai and Villupuram districts of Tamil Nadu, while another team completed the ethnobotanical survey of the Santhal people in

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- 26 A brief introduction of those research topics include: biodiversity, vegetation mapping, resource inventory, bioprospecting, carbon sequestration, micropropagation, ethnobotanical investigations, botanical authentication, botanical gardens conservation, and a digital herbarium.
- 27 Koyapillil Mathai Mathew, ed., *The Flora of Tamil Nadu Carnatic*, 4 vols. (Tiruchirappalli: Rapinat Herbarium, St. Joseph's College, 1981–88); Mathew, *Flora of Palni Hills*, 3 vols. (Tiruchirappalli: Rapinat Herbarium, St. Joseph's College, 1996–69).
- 28 Koyapillil Mathai Mathew, "Some Jesuit Contributions to Science and Development in India," *Ignis* 11, no. 4 (1982): 13–9.
- 29 S. John Britto received his doctorate under the mentorship of Mathew.
- 30 See, e.g., his co-authored book with Koyapillil Mathai Mathew, *Maiya Thamizhaga Kalavagai Thavarayi* [An excursion of flora in Tamil Nadu] (Tiruchirappalli: Rapinat Herbarium, St. Joseph's College, 1993); S. John Britto, *Molecular Systematics* (Tiruchirappalli: Rapinat Herbarium, St. Joseph's College, 2004); Britto, ed., *Orchid: Biodiversity and Conservation* (Tiruchirappalli: Rapinat Herbarium, St. Joseph's College, 2004); Britto, *Diversity of Plants: A Molecular Approach* (Tiruchirappalli: Rapinat Herbarium, St. Joseph's College, 2009).

the Bardhaman district of West Bengal.³¹ Another team, similarly, is in the process of completing the ethnobotanical assessment on the following: the Oraon tribal groups of Latehar district of Jharkhand state, the Koraku tribal groups of Balrampur district of Chhattisgarh, and the Malayan tribal groups of Thrissur district in Kerala.³² Reflecting another facet of its mission, the Rapinat Herbarium undertook *ex situ* conservation of rare, endangered, and threatened (RETS) species in the Palni Hills, with full communal involvement through programs of environmental education and an orientation and training in conservation techniques. Britto himself received the Tamil Nadu Scientist award from the government of Tamil Nadu in 2001 for his contributions in the field of environment.

Visuvasam Sousai (V. S.) Manickam, S.J. (1941–2012), a specialist in the ferns of the Western Ghats, established in 1987 a fernery for conservation purposes at the Centre for Biodiversity and Biotechnology in St. Xavier's College (Palayamkottai) and at Eattippallam, in Perumalmai, Tamil Nadu.³³ The main focus of this center is the mass propagation of RETS through plant tissue culture. Consequently, a variety of plants bear his name in some form.³⁴ Furthermore, he also reported species that represent new records for India,³⁵ meanwhile he established new records of plant species in Tamil Nadu,³⁶ and the Western

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- 31 See M. Thamacin Arulappan, S. John Britto, and Ignace Kindo, "Ethnobotany of Irulas in Gingee Hills, Tamil Nadu, India," *American Journal of Pharmtech Research* 4 (2014): 717–17, available online at <http://www.ajptr.com/archive/volume-4/august-2014-issue-4/44067.html> (accessed June 22, 2016).
- 32 S. John Britto, "Estimation of Deforestation of Forest Cover using GIS," in *Jesuits and Modern Science, Past Heritage, Present Status and Future Prospects* (Pune: ASSR, 2007), 222–29. See also The Rapinant Herbarium and Centre for Molecular Systematics, "Research Endeavors," June 2006 (last modified), http://rapinatherbarium.tripod.com/info_research.html (accessed June 14, 2016).
- 33 V. S. Manickam, "Biodiversity Research Carried out in CBB," *Caritas* (2006): 64–74.
- 34 Here are some examples: *Memecylon manickamii*, *Xanthophyllum manickamii*, *Eugenia manickamiana*, *Theriotophorum manickamii*, *Athyrium x manickamii*, *Thelypteris parasitica* (L.) *Tardieu subsp. manickirudorum*, and *Polystichum manickamianum*.
- 35 A sample of these cases include: *Syzygium neeanum*, *Eurya ceylanica*, *Habenaria dichopetala*, *Butea acuminata*, *Memecylon varians*, *Gymnostachyum paniculatum*, *Strobilanthes anceps var anceps*; and some species were rediscovered, such as *Tectaria zeylanica*—rediscovered after 120 years—and *Anogramma leptophylla*—rediscovered after 98 years.
- 36 Such as the following: *Argyreia choisyana*, *Zeuxine affinis*, *Pogostemon travancoricus*, *Litsea mysorensis*, *Thottea dinghoui*, *Jasminum roxburghianum*, *Clidemia hirta*, *Acacia pruinescens*, *Caesalpinia minor*, *Casia sericea*, *Canthium pergracile*, *Hedyotis wynadensis*, and *Meyna laxiflora*.

Ghats.³⁷ His full bibliography reflects considerable overlap and intersecting interests with his fellow Madurai Jesuits, both past and contemporary.³⁸

P. Joseph Xavier, S.J. (b.1961), a member of the task force that was commissioned by the Jesuit Secretariat in Rome, which eventually published *Healing a Broken World* in 2011, is also the main author of the humanitarian research project, *Weaving Hopes after Disasters*, which is the fruit of the collaboration between Indian Social Institute, Caritas India, and the Indo-Global Social Service Society, with the support of Caritas Germany.³⁹ As a participative assessment of the potential longitudinal impact of disaster relief, Xavier probes through framework of linking, relief, rehabilitation, and development (LRRD) possibly positive outcomes from the lessons of recent climatic catastrophes, in particular the following: the Odisha super-cyclone in 1999, and Odisha floods in 2001 and 2003, the 2001 earthquake in Kutch district of Gujarat, the 2004 tsunami in Tamil Nadu and Andhra Pradesh, and the Bihar floods in 2007 and 2008. His research mission and approach bear striking resemblance with the disaster risk reduction (DRR) approach that is adopted by Jesuit Conference Asia-Pacific (JCAP).⁴⁰

Savarimuthu Ignacimuthu, S.J. (b.1948)—the author of this article himself—has contributed much to the environmental cause, both by playing an important role in popular writings and thereby raising public awareness, especially

37 Some examples are: *Pteris wallichiana*, *Pteris ensiformis*, *Pteris heteromorpha*, *Bolbitis sinensis*, *Athyrium pecinatum*, *Athyrium attenuatum*, *Athyrium rubricaula*, *Athyrium schimperi*, *Athyrium rupicola*, *Cheilanthes rufa*, and *Cheilanthes dubia*.

38 See V. S. Manickam, S.J., “Studies on the Ecology and Cytotaxonomy of the Fern Flora of the Palni Hills (South India)” (PhD diss., University of Kerala, 1975); V. S. Manickam, and C. A. Ninan, *Ecological Studies on the Fern Flora of the Palni Hills, South India* (New Delhi: Today and Tomorrow’s Printers and Publishers, 1984); V. S. Manickam and V. Irudayaraj, *Cytology of the Ferns of the Western Ghats (South India)* (New Delhi: Today and Tomorrow’s Printers and Publishers, 1988); V. S. Manickam and V. Irudayaraj, *Pteridophyte Flora of the Western Ghats (South India)* (New Delhi: B. I. Publications, 1992); V. S. Manickam and S. Dominic Rajkumar, *Polymorphic Ferns of the Western Ghats, South India* (Dehradun: Bishen Singh Mahendra Pal Singh, 1999); V. S. Manickam and V. Irudayaraj, *Pteridophyte Flora of Nilgiris, South India* (Dehradun: Bishen Singh Mahendra Pal Singh, 2003); V. S. Manickam, *Flora of Tirunelveli Hills: Southern Western Ghats*, 2 vols. (Dehradun: Bishen Singh Mahendra Pal Singh, 2008). Additionally, he has published more than 180 research papers.

39 Joseph Xavier, S.J., et al., *Weaving Hopes after Disasters: Long-term Impact and Beneficiary Satisfaction of Relief, Rehabilitation and Development Programmes in India* (New Delhi: Indian Social Institute, 2015).

40 For further explanation of the DRR protocol, see the article by Pedro Walpole, S.J., in this issue.

women, students, and farmers. Along with research students at Entomology Research Institute (ERI) at Loyola College (Chennai), where he is the director, he has taken up numerous environmental activities.⁴¹ With an aim to promote environmental awareness, environmental protection, organic farming, and sustainable agriculture, in recent years, ERI's programs are extending into colleges, schools, and villages disseminating knowledge about eco-friendly crop cultivation and crop protection techniques. These informative sessions also detail the harmful effects of agrochemicals. To this date, nearly fifty thousand farmers, a similar number of students, and five thousand women empowerment groups have benefited. ERI also promotes biopesticides and biofertilizers in the region for organic farming, while discouraging the use of synthetic pesticides and fertilizers in favor of vermicompost and botanical pesticides. More quotidian goals are also instructed in the school-setting, such as energy and water conservation, recycling, the value of biodiversity, and basic education about fossil fuels.⁴²

PONNEEM, an eco-friendly natural pesticide developed by Ignacimuthu and Maria Packiam, S.J. (b.1975), is now available after many years of intensive laboratory- and field-experiments. As a patented biopesticide,⁴³ it is prepared by using natural oils, such as *neem* and *karanj*, and farmers are now trained in the technology to prepare it by themselves. Designed integrally as an anti-feedant, insecticide, a repellent, and growth regulator against insect pests and mosquitoes, PONNEEM yields better results, according to the surveyed farmers, than chemical pesticides and the crop yields tend to increase significantly as the beneficial insects continue to thrive in agroecosystems.⁴⁴

As for Ignacimuthu's bibliography, it includes numerous books and approximately six hundred research articles that fall within in the field of environment studies, broadly construed. Some of that bibliography is dedicated to producing agricultural material in Tamil, the predominant language of Tamil Nadu, and a portion of it also represents the standard textbooks in the region on various agricultural subjects.⁴⁵ Yet much of that extensive bibliography also

41 Savarimuthu Ignacimuthu, "My Mission through Scientific Research," *Omega* 14, no. 1 (2015): 110–25.

42 Savarimuthu Ignacimuthu, "Scientific Basis of Laudato si,'" *Ignis* 45, no. 4 (2015): 7–18.

43 See Indian patent no. 657/CHE/2006.

44 Rajan Maheswaran and Savarimuthu Ignacimuthu, "A Novel Biopesticides PONNEEM to Control Human Vector Mosquitoes *Anopheles stephensi* L. and *Culex quinquefasciatus* Say," *Environmental Science and Pollution Research* 22, no. 17 (2015): 13153–66.

45 For example, see Savarimuthu Ignacimuthu, *Chutru Choolal Vizhippunarvu* [Environmental awareness] (Vellore: Solai, 1994), which received the book award from the Tamil Nadu state government; also Ignacimuthu, *Chutru Choolal Vizhippunarvum Masukattupadum*

includes topics, in English, related to natural pesticides,⁴⁶ though others are intended to reach a broader readership beyond agricultural studies.⁴⁷ The state government of Tamil Nadu honored him with an award for his contributions to environment management in 2009, and he previously received the Tamil Nadu Scientist Award, in 2001, for his contribution to the field of biology.⁴⁸

For decades, Michael Charles, S.J. (b.1951), encouraged environmental awareness among students, particularly regarding the importance of plant diversity,

(Chennai: Vanathi, 1996), which is used as a textbook in schools and universities within the region; Ignacimuthu, *Eyarkai Velanmai* [Natural farming] (Chennai: Kannadasan, 2015) promises to be useful for a broad range of farmers in the practice of sustainable agriculture and organic farming.

- 46 For the a fulsome sample of the author's bibliography, see the following: Savarimuthu Ignacimuthu, S.J. and Alok Sen, eds., *Biopesticides in Insect Pest Management* (New Delhi: Phoenix Publishing House, 1999); Savarimuthu Ignacimuthu, S.J., Alok Sen, and S. Janarthanan, eds., *Biotechnological Applications for Integrated Pest Management* (Enfield, NH: Science Publishers, 2000); Savarimuthu Ignacimuthu, S.J. and Alok Sen, eds., *Microbials in Insect Pest Management* (Enfield, NH; New Delhi: Science Publishers; Oxford and IBH Publishers, 2001); Savarimuthu Ignacimuthu, S.J. and Alok Sen, eds., *Strategies in Integrated Pest Management: Current Trends and Future Prospects* (New Delhi: Phoenix Publishing House, 2002); Savarimuthu Ignacimuthu, S.J. and S. Jayaraj, eds. *Biological Control of Insect Pests* (New Delhi: Phoenix Publishing House, 2003); Ignacimuthu and Jayaraj, eds., *Sustainable Insect Pest Management* (New Delhi; Oxford: Narosa Publishing House; Alpha Science, 2005); Ignacimuthu and Jayaraj, eds., *Green Pesticides for Insect Pest Management* (New Delhi; Oxford: Narosa Publishing House-Alpha Science, 2005); Ignacimuthu and Jayaraj, eds., *Biodiversity and Insect Pest Management* (New Delhi-Oxford: Narosa Publishing House-Alpha Science, 2006); Ignacimuthu and Jayaraj, eds., *Biotechnology and Insect Pest Management* (New Delhi: Phoenix Publishing House, 2007); Ignacimuthu and Jayaraj, eds., *Recent Trends in Insect Pest Management* (New Delhi: Elite Publishing House, 2008); Ignacimuthu and B. Vasantharaj David, eds., *Eco-friendly Insect Pest Management* (New Delhi: Elite Publishing House, 2009); Savarimuthu Ignacimuthu, S.J. and B. Vasantharaj David, eds., *Non-chemical Insect Pest Management* (New Delhi: Elite Publishing House, 2010).
- 47 See Savarimuthu Ignacimuthu, S.J., *Environmental Awareness and Protection* (New Delhi: Phoenix Publishing House, 1998); Ignacimuthu, *Environmental Science* (New Delhi: Phoenix Publishing House, 2003); Ignacimuthu, *Ecology and Environment* (New Delhi: Elite Publishing House, 2006); Ignacimuthu, *Environmental Studies* (Chennai: M. J. P. Publishers, 2012); all of which are used as textbooks in university colleges throughout India. Besides these scientific works, Ignacimuthu, *Environmental Spirituality* (Mumbai: St. Paul's, 2010) serves as an inspirational book and a theological resource for motivating people toward environmental protection; see also the version in Tamil, Ignacimuthu, *Chutruchoolal' Aanmeegam* (Dindigul: Vaigarai, 2011).
- 48 See D'Souza, "Jesuit Contribution."

after he completed his doctoral studies on plant systematics under the guidance of K. M. Mathew.

Vincent Sekhar, S.J. (b.1953) is committed to promoting environmental awareness and the practice of interreligious dialogue, and in his latest book has focused on topics at the intersection of religion and ecology.⁴⁹

L. John Peter Arulanandam, S.J. (b.1971), having written his PhD dissertation on the micropropagation and conservation of two ferns from the Western Ghats, which qualify as RETS, is promoting tree plantations and rainwater harvesting among youth. Additionally, he has published fifteen research papers on biodiversity conservation.

John Kennedy, S.J. (b.1963), did his doctoral studies on the ethnobotanical aspects of the tribal groups in the Palni Hills, with special reference to traditional medicinal plants. Having written several books on environment and its conservation, he also conducted several training programs on environmental issues. In 2004, he organized an international conference on sea, land, and people after tsunami in Tamil Nadu.⁵⁰

S. Maria Packiam finished his doctoral studies on botanical pesticides and, along with his doctoral mentor—the author of this article—received a patent for PONNEEM, the botanical pesticide that was mentioned above. Involved in promoting sustainable agriculture and organic farming amongst farmers, he also dedicates part of his ministry towards educating students and religious as well. Both he and Ignacimuthu are currently establishing a sewage treatment plant and a solid waste management plant at Loyola College (Chennai), with the help of the Loyola Jesuit community.

Nepal Region

The Nepal region was part of Patna Province until 1985, and became a dependent region of the Patna Province in 1985. Bertrand Saubolle, S.J. (1904–82), a pioneer in the use of “gobar” gas, built the first prototype plant in Nepal. When the solar energy was first raised for consideration, he designed and

49 Vincent Sekhar, S.J., *Religions, Ecology, and Environment: Sacred Texts That Shape Perspective* (Bangalore: Claretian Publications, 2012).

50 S. M. John Kennedy, S.J., *Ethnobotanical Wisdom of the Tribals in the Palni Hills* (Delhi: Daya Publishing House, 2008), 254; see also *Sea, Land, People: Proceedings of the International Conference on Marine and Terrene Ecology (ICMTE) 17–19 January, 2006*, eds. M. Arunachalam, John D. Britto, and S. M. John Kennedy, S.J. (Dindigul: Vaigarai Publishers, 2006), 320.

constructed a prototype that provided hot water. In addition, he created an energy-conserving stove and held community workshops on its utility. Quite early in his mission in Nepal, as an avid apiarist, he became intrigued in bee-keeping as a science, and also introduced the breeding of rabbits as food for the villagers, and possibly even profit as an added revenue stream. He also wrote several booklets on these skills and distributed them to the community.

Patna Province

In 1919, the Patna mission was assigned to Missouri province (USA). In 1928, the Chicago province created out of the Missouri province, and so the mission was entrusted to Chicago. Subsequently, in 1955, the Detroit province was separated from Chicago, yet both provinces continued to share the responsibility for the Patna mission. In the following year, 1956, however, Patna finally became an independent vice-province, and in 1961 a province.

T. Daniel Rice, S.J. (1918–91), organized the construction of check dams—temporary measures to counteract erosion or mitigate the flow of small waterways—in order to conserve water for the tribal people in Sokho, Bihar. He is also assisting them in their efforts to plant trees in an arid region of Bihar.

Almost fifty years ago, Joseph La Mielle, S.J. (1920–2009), constructed a time-tested biogas plant in Xavier Technical Training Institute. The novel design has survived to the present day, continuously supplying plenty of cooking gas for a community of fifty to one hundred people. He also constructed an irrigation system at the same time, which still survives as well.

K. E. Joseph, S.J. (1926–99), started Bihar Water Development Society in the 1970s and assisting local communities of South Bihar in digging wells and tubewells.

M. M. Mathew, S.J. (b.1955), usually referred to as “Solar Mathew,” established the province’s first initiative on solar power, a major step for the conference as well. Having started the Solar Alternatives project, which manufactures a variety of solar-powered appliances, he also orchestrated similar goals within the Gujarat province.

Since approximately 2000, Paul Mariadoss, S.J. (b.1964), as the director of Solar Alternatives and an electronic specialist, has installed photovoltaic systems in numerous places. He broadened the program considerably into the community after recruiting several Jesuits onto this project.

Jose Thayil, S.J. (b.1952), is promoting eco-spirituality in his classes in Jnana Deep Vidyalaya, and also promoted Tarumitra as a special ministry in Pune’s Pal Seminary.

Br. Sahaya Nathan, S.J. (b.1962), started experimenting with organic farming in Bettiah, Bihar, and since then has taken an eco-friendly stance in his educational apostolate.

Joseph Parekattil, S.J. (b.1936), an autodidactic architect, helped the local Tarumitra to construct all its buildings by using innovative eco-friendly construction techniques. This transmission of best practices is also enabling a sort of demonstration of its environmental benefits to all those who visit and volunteer at the site.

N. Siji Varghese, S.J. (b.1975), an enthusiast and activist on the ecological front, authored a textbook on eco-spirituality, *Children of the Rainbow*, which is an appreciated resource for those involved in formation, both theologians and activists.⁵¹

Robert Athickal, mentioned above, is deeply involved in Tarumitra, the organization that was initiated in Patna, in 1988, under his guidance while he was at St. Xavier's High School. Students have since then received sixteen awards in recognition for their work and environmental vision. The student forum currently operates from the Tarumitra Ashram, in the city of Digha Ghat in the Patna district of Bihar, where a bioserve is situated that intends to restore the rich biodiversity of the Indo-Gangetic plains that was once home to over one thousand varieties of trees. As a major part of the movement's mission, the bioserve constitutes already more than four hundred varieties of trees in its spacious campus and aims to expand upon this number in the upcoming decade. In addition to these conservation efforts, since 2011 Tarumitra is engaged in organic farming.

Pune Province

Pune Province, established in 1992, was previously part of the composite Goa-Pune Province. The Pune Jesuits, and especially Hermann Bacher, S.J. (b.1925), established the Social Centre (Ahmednagar), in 1996 to promote an integrated plan of sustainable development that is specifically directed towards the communities of the drought-prone Ahmednagar district and the surrounding environs of Maharashtra. Bacher himself, as the pioneer of "Right to Valley," the watershed development part of the center, initiated this large-scale scheme in order to reserve sufficient volume of water for both drinking and irrigation, for the region's farmers who are dependent upon rain-fed agriculture. In

51 Siji Noorokariyil, *Children of the Rainbow: An Integral Vision and Spirituality for Our Wounded Planet* (Delhi: Media House, 2007).

fact, it became the template for the national program that the central Indian government authorized through the National Bank for Agriculture and Rural Development. The Social Centre, for its part, pays particular attention to environmental conservation and regeneration, as well as other issues, including: organic farming with soil conservation, multiple intercropping patterns, poverty alleviation, farmers' clubs, the promotion and empowerment of women, housing, natural and solar energy, a children's parliament, and public health policy and education.⁵²

Ranchi Province

Ranchi Province was created in 1956, having been bifurcated from its mother province that is based in Calcutta. Alois Beck, S.J. (b.1953), frequently collaborating with government projects and NGOs, undertook various campaigns to create check dams and small reservoirs that can sustain large-scale irrigation. Joseph Marianus Kujur, S.J. (b.1960) writes on tribal women and sustainable ecology, and other topics that interface development and ecology.

Blacius Tigga, S.J. (b.1961), concentrates his ministry on the water harvesting schemes in parishes and the villages. For instance, on sloped and hilly terrain, he advises communities to develop a tiered system of cultivation for the purposes of preserving the rainwater. He also facilitates the creation of tube-wells in local communities.

Sikander Kerketta, S.J. (b.1971), coordinated a tree planting campaign in collaboration with local parishes—from the dioceses of Ranchi, Simdega, Gumla, Khunti, and Daltongunj—the state government, and various NGOs. As a result, with such communal cooperation, nearly eight thousand saplings were planted in the South Chotanagpur district.

Sylvanus Kerketta, S.J. (b.1956), played an active role in the Village Development Scheme, in which he promoted sericulture, specifically planting mulberry trees in the villages around Gumla. With the participation of villagers, he also built three check dams for irrigation and horticulture in this district. Presently stationed at the Agricultural Training Centre (Namkum), he planted two hundred mango trees, 150 coffee plants, fifty guava, and twenty-five leechi fruit trees.

After 2010, the Jesuits of Ranchi province expressed a special intention to plant trees in all of their places of engagement. In many parts of Jharkhand, Ajay Soreng, S.J. (b.1947), planted saplings of mango, guava, and leechi fruit

52 SocialCentre(Ahmednagar), <http://socialcentre.org/integrated-development-of-land-and-people/> (accessed June 14, 2016).

trees, as well as timber trees, and other decorative varieties. His program is especially aimed to mobilize communities towards mass plantings, and thus far two thousand saplings have been planted. Likewise, throughout Jharkhand, Nicholas Tete, S.J. (b.1952), helped supply tree saplings, specifically to students. George Kerketta, S.J. (b.1954), distributed a several thousand saplings to local communities, and especially students, encouraging people to preserve and protect their forests from fires. Alex Toppo, S.J. (b.1959), planted trees, such as teak, mahogany, and a variety of native evergreen called false ashoka, as well as several types of fruit trees—in total, more than three hundred trees. As a result, many parishes in Ranchi are marked with orchards and more densely forested areas as a sign of this increased ecological consciousness.

Not to be forgotten, Prem Xalxo, S.J. (b.1966), organized many provincial roundtable-style conferences in response to Pope Francis's encyclical, *Laudato si'*, in order to bridge the discourse between South Asia and Rome, and is a vocal advocate for environmental justice.⁵³

Sri Lanka

Belgian Jesuits established the mission of Galle in 1893 and, in that same year, Jesuit missionaries from Champagne province (France) established the Trincomalee mission. Later, in 1924, the Galle mission was handed over to the Naples province (Italy), while the Trincomalee mission was entrusted in 1945 to the New Orleans Province (USA). In 1962, the two missions were finally amalgamated to form an independent Sri Lankan province.

Louis H. Cramer, S.J. (1924–2008), studied the floral biodiversity of Sri Lanka and wrote a book on Sri Lankan flora.⁵⁴ Guy Rajendran, S.J. (b.1934), promoted the biological control of insect pests by using beneficial natural enemies, and has also published several research papers on the topic.

Conclusion

Inspired by the environmental activities of many earlier Jesuits in India and Sri Lanka, the present generation of Jesuits are carrying out notable works that

53 See Prem Xalxo, "Interplay of Faith and Justice in Environmental Issues," *Promotio iustitiae* 111 (2013): 15–21.

54 See L. H. Cramer, S.J., *The Revision of the Flora of Ceylon* (Peradeniya: Botanical Society, University of Sri Lanka); Cramer, "Acanthaceae," in *A Revised Handbook to the Flora of Ceylon*, ed. M. D. Dassanayake (Rotterdam: A. A. Balkema, 1980), 121–140.

are intimately related to their environmental context. On the one hand, some individuals are making the growth of environmental awareness a central aspect of their ministry. On the other hand, several Jesuits continue the legacy of the Society in this region in studying the ecosystem in its intricacies, whether through botany or other more agricultural disciplines. Various Jesuits provinces throughout South Asia are promoting programs, such as tree planting, the preservation of safe drinking water, the development of solar energy, creating watersheds, organic farming, methods of sustainable agriculture, biopesticides, and the micropropagation of RETS. As a result of these initiatives, several Jesuits were recognized and awarded by the government for their environmentalist contributions. Still, the educational apostolate remains a major part of this outreach, including the publication of books that are focused on agricultural and botanical subjects, and theological topics that encompass eco-spirituality and environmental justice.