

## Inland mangroves of the world

Tripathi *et al.*<sup>1</sup> have failed to thoroughly review and cite papers related to the occurrence of inland mangrove sites reported from various other countries worldwide<sup>2-12</sup>. Mangroves (both inland and coastal) have been revered by various local communities as sacred groves for centuries<sup>13,14</sup>. A couple of islands of Gujarat itself have Muslim religious sites where not only mangroves but the fauna also receive protection due to auspicious reasons<sup>13</sup>.

The first paper on inland mangroves was published in 1963 by van Steenis<sup>10</sup>. Since then, several papers have been published explaining their uniqueness<sup>2-12</sup>. Trejo-Torres *et al.* described inland mangroves (*Rhizophora mangle* and *Laguncularia racemosa*) in Yucatan Peninsula<sup>6</sup>. Similarly, Lugo described their presence 50 km inland on the island of Inagua in the Bahamas<sup>5</sup>. Inland mangroves (*R. mangle*, *Avicennia germinans* and *L. racemosa*) of Barbuda have been reported to lack connection to sea and associated with geological and geomorphic features of late Pleistocene or pre-recent age<sup>8</sup>. At Mandora salt marshes of Australia, *Avicennia marina* trees have been reported 25 km inland from the ocean<sup>4</sup>. Yet another report from Australia described the inland *A. marina* mangroves in Lake MacLeod<sup>7</sup>. The inland mangroves (*R. mangle*) of Lake Izabal in Guatemala occur 42 km inland in association with freshwater plants<sup>9</sup>. Pakistan's largest freshwater lake (Keenjhar) also harbours inland mangroves (*A. marina*)<sup>12</sup>.

Tripathi *et al.*<sup>1</sup> have wrongly quoted our paper<sup>15</sup> by citing that we had reported the existence of a total of 18 plants from the inland mangroves of Kachchh. There is no mentioning of 18 plants anywhere in our paper so I wonder why they have given this false number. Also, they have copied the sentences directly from our paper<sup>15</sup> along with minor manipulation and those sentences are as follows: '...in a totally land-locked position without any surface connection to sea' (line 29); '...80 km inland from the nearest coastal belt of the Gulf of Kachchh and 150 km from the Arabian Sea and is situated in the eastern part of Banni' (line 44); 'over two millennia ago the Rann of Kachchh was a shallow sea' (line 58); 'deserves immediate conservation and management attention' (line

273); 'In several coastal areas of India, mangrove forests have been successfully restored' (line 276); 'So this small patch of mangrove can easily be restored...' (line 281).

I am aware that it is not an easy job for the editors and reviewers to crosscheck each and every sentence of all the articles submitted to the journal by potential authors. However, I hope the journal will take serious action against those who break the professional publishing ethical code of conduct to maintain scientific integrity.

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6. Trejo-Torres, J. C. *et al.*, In *Biodiversidad Marina y Costera de Mexico Comision Nacional de Biodiversidad y Centro de Investigaciones de Quintana Roo* (eds Salazar-Vallejo, S. I. and González, E.), Chetumal, Mexico, 1993, pp. 660–672.
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10. van Steenis, C. G. G. J., *Nova Guinea Bot.*, 1963, **12**, 189.
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14. Kathiresan, K. and Bingham B. L., *Adv. Mar. Biol.*, 2001, **40**, 81–251.
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### Reply:

We agree that there are so many inland mangroves present in the world. Patel and Agormoorthy have described<sup>1</sup> that only a few cases of surviving inland mangroves far away from sea worldwide have been reported in the literature with all located either on islands, deltas and lagoons and along fringes of water bodies. A few of them thrive in the regions with distinct dry seasons while others have poor connection to the seas in different countries. However, no work is available on inland mangrove with peculiar patch of inland mangrove in a totally landlocked position without any surface connection to sea, also called anchialine with unique geological, environmental ecological conditions on sacred grove, except by Patel and Agormoorthy<sup>1</sup>, who did not mention that this is the only sacred grove present in inland mangrove in landlocked condition in arid environment of Kachchh, Gujarat. Till date there are no publications about the sacred grove in inland mangrove ecosystems with preliminary characterization of soil and vegetation. Our work<sup>2</sup> reported this important inland mangrove in sacred grove. However, detailed studies are still required to know the causes of its concern and threats.

We made an attempt<sup>2</sup> to depict the only inland mangrove having unique co-existence with *Avicennia marina*–*Salvadora* community in which a sacred grove is at great environmental and ecological threat, with gradual degradation of its structural and functional components and number of individuals. Patel and Agormoorthy<sup>1</sup> also reported that two decades ago, there were 60 adult trees in a dense patch and unfortunately half were destroyed during the 1998 cyclone. So the number should have been 30, but we reported it as 18, which has now reduced to 16 individuals in which only 8 plants are native and the rest are coppiced branches. Hence there is a chance of total elimination from the site without anthropogenic pressure and only the remnants of the plant community exist at present. Therefore, there is need to draw the attention of global scientists and the government for its protection.

We have gone through the paper of Patel and Agormoorthy and cited their

work duly in the text. Our intention was clearly not to hide any information. However, some of the words match with those of Patel and Agoramorthy which are in common public domain like land locked position without any surface connection also called anchialine<sup>3,4</sup>. This has been also quoted in websites (<http://copal-india.blogspot.in/2013/07/sacred-in-land-mangroves-in-kachchh.html>). There is no technical citation taken without proper reference.

We agree with Patel, that mangroves have a long historical link with human culture and civilization. Spirit houses are common in Asian countries especially in India, Myanmar, Thailand and Cambodia. At the entry point of Sundarbans, 'Bano bibi' temples are present for worship by local people. This temple consists of Bano bibi for the Muslims, and 'vano devi' for the Hindus religious people. In the third century, a Hindu temple to the mangrove *Excoecaria agallocha* was erected in south India. The city where this temple is found bears the name of the mangrove species. In Kenya, shrines built in the mangrove forests are worshipped by the local people, who believe spirits of the shrine will bring death to those who cut the surrounding trees<sup>5,6</sup>.

In the Solomon Islands, the bodies of the dead are disposed off and special rites are performed in the mangrove waters<sup>7</sup>.

These are the general remarks given by several authors<sup>5-7</sup>, but none has mentioned or studied the inland nature of the mangrove with specific geological conditions; about its uniqueness and landlocked conditions to be called inland mangrove. So we considered a unique and the only inland mangrove in sacred grove in arid environment of the world. Further, Patel has mentioned islands of Gujarat itself have inland mangrove with sacred groves, but the peculiarity lies with the structural and functional components of the system, which can depict and forecast the future trend. We reported these aspects of the system along with considering the inland mangrove feature of sacred grove. As far as our knowledge goes, no scientific, peer-reviewed publication has cited this feature of Shraavan Kavariya inland mangrove so far.

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