v1: 20 August 2024

Research Article

Urban Agroecosystems for Future Food Self-Sufficiency in Cities: Dynamics of Yamuna River Sandbars in Delhi

Peer-approved: 20 August 2024

Qeios, Vol. 6 (2024)
ISSN: 2632-3834

Pulak Das[1]

1. School of Human Ecology, Ambedkar University Delhi, New Delhi, India

The present paper discusses the possibility of using urban agroecosystems for self-sufficiency in food supplies in cities. It throws light on the possibility of using river sandbars in Delhi for growing food. These sandbars are already being used for different purposes, including growing vegetables and for animal husbandry. The river provides free space through silt deposition every year, which may be used for agriculture. The leasing system may be streamlined, and the question of justice needs to be brought into the overall management system. Interestingly, the NGT has kept a ban on agriculture in Yamuna sandbars due to cases of pollution.

Corresponding author: Pulak Das, pulakdas.ecology@gmail.com

Yamuna sandbars in Delhi

During the process of erosion and sedimentation, new fragile lands emerge in between the flow channels and banks of some rivers. These lands are called channel deposits, channel bars, or sandbars. These channel bars do not remain stable and normally have a longitudinal migration. They emerge, submerge, and re-emerge continuously [1]. Vegetation succession on channel bars can increase the stability of these semi-stable lands [2] and take the form of a riverine island. In the middle Ganga plains of eastern Uttar Pradesh and Bihar states of India, these islands are known as *Diaras* and are made of coarser sands and gravels [3]. In the Indus plains in Pakistan, these lands are described as *Kuchha* (wet and fragile, as opposed to *Pucca*, or more permanent lands) and *Baet* (rising like mounds between the two branches of rivers). In Bengal, the north-eastern states of Assam and Tripura, and in Bangladesh, these are called *Chars (Charlands)* or river islands [3]. Yamuna is one of the important rivers in India along which lie cities of great historical and cultural importance. The river enters the National Capital Territory (NCT) of Delhi at Palla in the north and exits at Jaitpur in the south, travelling a distance of around 52 kilometres within Delhi. Like many other rivers, sandbars are observed within the river Yamuna and its banks as well. It is evident from satellite imageries, field observations, and various studies that these shifting channel deposits support numerous agroecosystems and socio-economic activities along its stretch within and near the NCT of Delhi ([4][5][6][7][8][9]).

Sandbar dynamicity

Sandbars are found both in braided river channels and meandering river channels. A floating sandbar is completely surrounded by water and is away from the mainland, while an attached sandbar remains attached to the mainland. Although transient in nature, these sandbars are very fertile due to the occurrence of frequent floods, and they support population and agriculture. People residing on or dependent on these sandbars are vulnerable and therefore do suffer loss of life and livelihood due to the flood and the dynamic nature of these lands. The socio-economic activities

 doi.org/10.32388/E9I3KF.3

supported by the sandbars are fishing, farming, pastoralism, grazing, and the collection of different types of grass. River sandbars are dynamic in terms of area covered, both through reduction and increase across time. For example, the sandbar areas in the Brahmaputra River in Assam increased by 23% during 1988 to 2018 [10]. A sandbar's suitability as agricultural land, however, depends on various factors such as flow pattern, seasonality, location, bridges on the river, river training works, particle size, and nutrient richness, etc. [11].

Urban agriculture

Urban agriculture is available on various lands worldwide, such as school grounds, housing facilities, rooftops, vacant lands, etc. [12][13]. Urban agroecosystems also involve private gardens, urban farms, orchards, and community gardens [14]. Various ideas are also observed, such as urban food forests, urban agroforestry, permaculture gardens, etc. [15]. Agroecosystems in urban lands have the potential for meeting human needs along with other ecosystem services [15]. Urban agriculture is seen as a sustainable alternative to increase food security, considering increases in food prices, increasing energy costs, demographic pressures, and the corporatisation of food markets. [16][17]. In urban agroecosystems, focusing on agricultural yield only, however, often overlooks inequitable food access and other associated challenges, which are the result of historic faults such as pollution and soil contamination, land access and tenure system, developmental pressure, etc., among others [18]. Such a conventional way of defining urban agriculture often fails to identify the problems within the system [19]. Urban agriculture would require thirty percent of the total urban area to meet the global demand for vegetables, which is not possible due to land tenure systems and urban sprawl issues [20][21]. Urban river sandbars may play a major role in providing the additional land across the globe. As estimated by De Zeeuw et al. [22], a city with 10 million people or more has to import over 10,000 tons of food every day, traveling an average of 1,000 miles. Delhi's population is roughly around 20 million. The present paper studies these agroecosystems in some of the Yamuna river sandbars/islands in two locations in Delhi. These sandbars legally come under the local administration and are used by people for different activities like agriculture, fishing, collection of various types of grasses, and grazing of livestock.

The three sites

Three sites were involved in this study to understand the use of land pieces created by the river Yamuna in Delhi (Fig.1). The study was conducted during the years 2016, 2018, and 2020. It involves field surveys, desk-based study, and secondary literature. Focused group discussions and meetings were arranged with people living in different sandbars in Delhi. Secondary data have been studied from various research articles, published reports, and various other documents on the related topics, for a better understanding of the existing property rights, socio-economic activities, agroecosystems, and the dynamicity of the channel deposits.

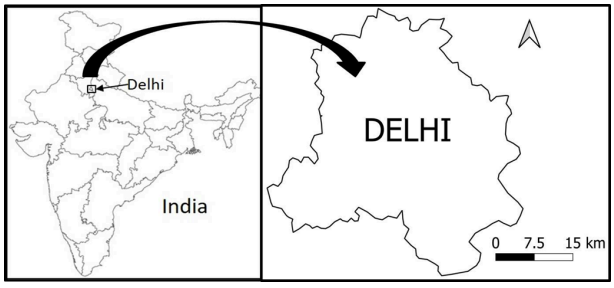

Figure 1. The study sites in River Yamuna in Delhi

Changing sandbars

The sandbars showed continuous change in area from 56 acres in 2006 to 21 acres in 2020. This decrease was not gradual but kept changing from year to year. It first showed a decrease from 2006 to 2008, and after a small increase up to 2016, it again showed a decrease until 2020. From 2018 until 2020, the overall area decreased. The southern sandbar in 2008 was not completely attached to the right bank until 2016-2018, when it started coming towards the bank. After the last massive floods in the Yamuna River in 2020, this has completely attached to the bank, and a new, comparatively smaller bar emerged parallelly towards the upper left side, roughly around the first half of 2020. Another channel of bars has encountered many changes both spatially and temporally between 2018 and 2020. From around 6-8 bars between 2006 and 2018, there were only three bars in 2020. The area coverage also changed from around 21 acres to 64 acres in 18 years. In 2006, the study area was divided into fragments, and there was also a difference in its shape compared to the present study area. In 2006, the shape was quite irregular. The channel deposit was near the right bank of the river.

The sandbar was much closer to the top of the island – the north side of it. The larger island had much smoother boundaries than the small islands. The shape of the channel deposit was broader towards the upper side and narrower from the lower side.

The sandbars under study had a tenure system until 2006, particularly the land that was not attached to the banks. That was the time when there were around 40 farmers practicing agriculture on the attached part of the sandbars for the last 30 years. The Delhi Peasants Co-operative Multipurpose Society Ltd. used to give land on lease to them, and each received patches of different sizes/expanse on the sandbar for agricultural purposes. The sandbars attached to banks were leased out by locals. Out of these 15-18 farmers, some used to take land for farming from both of them, i.e., the Society and the locals. The land they used to get from the local community was situated on the mainland, and that for Rs.2000-3000 per bigha. Whereas, the land they got from the society was situated on the sandbar area, and the lease/rent amount for the floodplains was Rs.1000 per bigha. It is observed that there is a role of middlemen who lease out the channel deposits to people for various uses. These middlemen are apparently powerful, wealthy, and elite, and since they live near these unstable newly emerged sandbars, they claim a sort of ownership of them. The Delhi Development Authority (DDA) seems to pay some compensation to these claimants for the crops and seeds that are planted there, although they do not compensate for the land, as the land belongs to the DDA. The *claimants* seem to decide the price of the sandbar after inspecting (if the area of the sandbar has increased or decreased) the land area in October. They examine the area of the land and accordingly raise or lower the price of the land to the farmers. Other users of the sandbars, such as those who collect grass which is available here, also pay a fixed monthly amount of Rs 2000/month to these middlemen.

Agroecosystems in channel deposits

There are two sandbars: one is attached to the mainland, whereas the other one is a floating sandbar or a riverine island. Only two small patches are under cultivation on the larger attached sandbar. However, a rather large area is cultivated each year by the three families of farmers on the floating sandbar. Farming, mainly of vegetables, has been done on both sandbars for around twenty years now. In the upper deposit, farming has been going on since 2014. For farming on these channel bars and to move to and fro, the families had three boats with them, made out of thermocol. It is observed that large patches on these channel deposits are also seemingly barren, although patches of grass were also observed. The families own a small land area in the lower channel deposit, growing different kinds of vegetables. The amount of land that is cultivated in a season depends on the economic condition of a family, i.e., how much they are capable of investing in terms of seeds, fertilizers, and various other farm needs, and the number of family members available in that season to carry out farming. No external laborers are used, and the dependence is entirely on family members. To buy seeds, fertilizers, insecticides, tools, etc., the farmers depend on the '*arhatiya*' or the wholesale retailer in the wholesale market, who charges an extra 7-15 percent interest on the money lent by them. By lending this money, the farmers are bound to sell the harvested crop to that particular "*arhatiya*" only. It was observed that a large part of the sandbar was used for the purpose of agriculture, which is stable. External laborers are used here, and moneylenders play an important role. Pasturage refers to the land that is used for pastures. But it is not always the case that they are visited or used by pastoralists only. There could be many types of people who could be rearing livestock and therefore be dependent on a particular land to graze them on it. The sandbars under study were also being visited by people who practice livestock rearing. The criteria for differentiation in the usage of the sandbars as pastures are based on the location; either they live on the sandbar or are from outside, and the rearing type (direct or indirect). It is observed that the maximum usage of the sandbar was done mainly by the community involved in dairy farming. The farmers used to graze their animals, etc. Farmers use grass to feed the livestock, including buffaloes, goats, and hens. Another user of the pastures is the grass-gathering family from the sandbar. Pastoralists use the maximum proportion of grass on the sandbar. The reason for this is the huge number of cattle; elephants and camels graze the grass.

The total population dependent on the sandbar for various activities is over 160, out of which 87% are labourers who are engaged in the agricultural fields of the farmers. These labourers are dependent on the island for 6-7 months, after which they migrate to their hometown in Bihar. Farmers who have agricultural fields on the sandbar, including their family members, are 23 in number. These involve fishermen, pastoralists, grass gatherers, and florists. Salt cedar sellers who are dependent on the sandbar for the whole year (except on days of flood) are 7 out of the total. Just like the cattle grazers, people with their camels and elephants visit

the study area and leave them for grazing there for six to eight hours, during June to September. The fishermen who visit the island frequently have licenses that are issued to them by the government itself. These fishermen look for the stretch of river in which they can easily spread their fishing nets. The study of the area revealed that 6 people come on alternate days to the island to catch fish. The species of fish which they trap from the island is catfish, whose price depends on the size and weight of the fish. For a normal 2 kg fish, they get 100-200 rupees. The income of fishermen fluctuates per month as it depends on the availability of fish. A rough estimate suggests 150 kg. Among inputs (Table 1), the seeds are brought by farmers. The price varies depending on the type of seeds. The fertilizers are brought from other areas ranging from 11 to 18 kms. They use 5-15 bottles of fertilizers for one cropping season. Urea is not used in the agricultural fields at all or is used in a very small quantity. Pesticides used in the field are Profex, Nagraj, Blotinax, and Atabron in different quantities. The farmers used to spray the weedicide in the farmland. The weedicides are first mixed with water before spraying. They need to spray one to three bottles of it in a season. Fertilizers are being sprayed in a good quantity in the field. It is observed that an amount of 2-7 lakhs rupees was spent on labour, seeds, and fertilizers in total. 20,000 - 60,000 rupees were invested in the seeds of all crops.

doi.org/10.32388/E9I3KF.3

Input	Site 1	Site 2	Site 3
Seed	7 kg	8 kg	12 kg
Pesticide	0	64.25 liters	51 liters
Output			
Vegetables	31345 kg	81000 kg	730000 kg

Table 1. The input-output in the agroecosystem

Food self-sufficiency

It is important to bring urban agriculture within the design of cities to address issues related to the environment and economics [23]. As urban farming provides beneficial ecological, social, and educational services, it needs similar importance as schools, museums, parks, and modern infrastructure in city planning [24]. Studies indicate that between 76 and 90% of vegetables are provided by urban agriculture in Dar es Salaam, Tanzania, Shanghai, and Beijing. Dakar produces around 60% of Senegal's vegetables. In Vietnam, 80% of fresh vegetables come from urban areas [17]. Overall, global estimates of available space for urban agriculture range from 1-7 million hectares or 1.4%–11% of the urban area [25]. Urban food production has increased by around 30% between the early 1990s and mid-2000 [20]. For proper food planning in urban areas, Deh-Tor [26] forwards two ideas; first, to stop separating agriculture from urbanisation conceptually, which he suggests is driven by a capitalistic mindset and is not real. Second, the land for food production, and its quality, in urban areas needs to be one of the central points of focus in urban planning. This would mean proactive policies for land protection in urban areas.

Power dynamics

Lahiri [3] explains that people who live adjacent to the newly emerged sandbar, or people who are richer or have better political affiliations, mobilise higher sentries and gain control over these islands, particularly of cropping and harvesting on these lands. This further leads to disputes over the ownership of lands. In the present study, it is observed that when the sandbar has emerged close to the land of the claimant who, being powerful and rich, has taken control of the sandbar and has given the land on lease to the two farmers for practising agriculture on it. In Bangladesh, however, it is observed [27] that these charlands belong to the government but are illegally taken over by the people living close to these. These unusable lands, once approached/accessed by poor people, can be put to use by providing them with livelihood and food security. Hammelman et al. [28] in a study in Argentina mentioned the power dynamics embedded in sustaining agroecological projects in urban areas. In the present study also, we can observe power dynamics in a very different setting.

Suitable for different vegetables and crops

Agriculture is being practiced inside the urban areas of Delhi and its outskirts, and it plays a significant role in contributing towards the urban economy. Agroecosystems in river sandbars establish various linkages in local markets and fulfill local needs through agricultural output. Dynamic channel deposits in both study areas are located amidst the urban landscape of Delhi and contribute towards the city's economy. A great part of its share is sold by farmers in the nearby Azadpur *mandi* or wholesale market, from where it is bought by different local retailers who, in turn, sell their produce to various parts of Delhi and the NCR region. Also, the farmers themselves sell their vegetables to the residents of the neighbouring areas. Krishnamurthy [29] and Chowdhury [30] have elucidated how Bangladesh is relying upon sandbar cropping, growing pumpkin and squash as a means to achieve

multiple goals, in large quantities on sandbars. Pimental [31] has discussed agroecosystems and how the resources derived from them, when used as input, could bring efficient results and therefore output in the crop production system. The author has argued that the energy input, in the case of agroecosystems, has evolved and become very demanding over time. The inputs and outputs in the present study include the use of fuelwood, fertilizers, pesticides, tractors, use of livestock/animal energy, labor/manpower on the farms, and other modern intensive agricultural management tools to carry out farming. The paper by Rahman and Reza [32] has emphasized the cultivation of the "palej" crop on the charlands (sandbars), specifically pumpkin, similar to the present study area. The pumpkin cultivation was practised on the charlands formed by the Brahmputra river, which were earlier considered barren. The crop of pumpkin is grown on these lands as the crop is more adapted and requires low water for irrigation. A similar technique of digging furrows in the ground to grow '*palej*' is observed in the present study, where crops can pull the groundwater on their own. Randhawa [33] mentions that one of the methods to sell the crops in a small town is through brokers or *dalals* who help the farmers to dispose of their produce to the wholesalers known as *Arhatiyas*. Ashraf et al. [34] explain that the lease system on the charlands is very complex. These lands belong to the state legally but, in reality, are owned by the powerful elite who act as feudal lords to the people living on the sandbars. The average farmer is so poor and indebted that he sells his produce to *Arhatiya* so as to clear his previous debts and therefore plays an important role. Moreover, the farmers do not have warehousing facilities to store the produce longer, and therefore bring the produce to the mandi on the same day and sell it to the *Arhatiya*. He works both as a moneylender and a trader [35]. In the present study, it is observed that farmers do not get the actual price of their produce. The rate of the vegetables depends on the market. If they harvest the vegetables on the day when the price of that vegetable is low in the market, they have to sell it to the *arhatiya* anyway. If they were to keep the vegetables for long, the vegetables might get rotten. The *arhatiya* is not fixed. Once the money taken from the *arhatiya* is paid back to him by the farmers, the farmers can even switch to another *arhatiya*.

Acknowledgements

The author would like to acknowledge Ms. Yashika Gupta, Ms. Shipra Maheshwari, Mr. Tarun Kumar, and other respondents from the study sites for participating in the study.

References

1. ^T.K. Das, S.K. Haldar, I.D. Gupta, S. Sen, River Bank Erosion Induced Human Displacement and Its Consequences, Living Rev. Landscape Res., 8 (3), (2014). http://dx.doi.org/10.12942/lrlr-2014-3
2. ^T.J. Coulthard, Effects of Vegetation on Braided Stream Pattern and Dynamics, Water Resources Research, 41: (2005) W04003, [doi] 10.1029/2004WR003201.
3. a, b, cK. Lahiri-Dutt, Chars: Islands that float within rivers, Shima: The International Journal of Research into Island Cultures 8 (2), 2014, 22-38
4. ^B. Gopal, D.K. Banerjee, T.R. Rao, Enhancing water flow in River Yamuna at Delhi Research and Action Plan, for National River Conservation Directorate, MoEF New Delhi, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi, 2002, pp: 236
5. ^National Dalit Watch, The uncertainties of life, living through waters of dejection, National Campaign on Dalit Human Rights, New Delhi, www.ncdhr.org.in, 2010
6. ^A. Baviskar, What the Eye Does Not See: The Yamuna in the Imagination of Delhi, Economic & Political Weekly, Vol-xlvi, No. 50 (2011)
7. ^C.R. Babu, A.K. Gosain, B. Gopal, Restoration and conservation of River Yamuna, Final Report Submitted to National Green Tribunal. (Tribunal's order dated 24 September 2013), 2013, Expert Committee constituted by the Ministry of Environment and Forests, New Delhi (Order No. K-1301/2/2013-NRCD Dated 13 September, 2013).
8. ^S. Maheshwari, The geographical and socio-economic dynamics of life in the Yamuna sandbars in Delhi, MA Internship report, School of Human ecology, Ambedkar University Delhi, 2016
9. ^Y. Gupta, Socio – economic impacts of unstable channel deposits in River Yamuna at Delhi using GIS, MA Internship report, School of Human ecology, Ambedkar University Delhi, 2016
10. ^M. Prashnani, A. Qadir, J. Goswami, P.L.N. Raju, Spatio-temporal study of Brahmaputra River Islands (CHARS) for agriculture expansion in Assam, India. In: International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives, 42(3/W6), 2019, pp. 429–433. https://doi.org/10.5194/isprs-archives-XLII-3-W6-429-2019.
11. ^G. Talukdar, A.K. Sarma, R.K. Bhattachajya, 2021. Sediment analysis and modelling based approach for optimal allocation of riverine sandbar for socio economic

benefits, Ecological Engineering 173, 106415, https://doi.org/10.1016/j.ecoleng.2021.106415

12. ^*R. Fricano, C. Davis, How well is urban agriculture growing in the Southern United States? Trends and issues from the perspective of urban planners regulating urban agriculture. J. Agric. Food Syst. Community Dev., 9, 31–53 (2020)*
13. ^*B.B. Lin, S.M. Philpott, S. Jha, The future of urban agriculture and biodiversity-ecosystem services: Challenges and next steps. Basic Appl. Ecol. 16, 189 (2015)*
14. ^*S. Jha, M. Egerer, P. Bichier, H. Cohen, H. Liere, B. Lin, A. Lucatero, S.M. Philpott, Multiple ecosystem service synergies and landscape mediation of biodiversity within urban agroecosystems, Ecology Letters, 26(3) (2023) 369-383. https://doi.org/10.1111/ele.14146*
15. a, b*T. Thiesen, M.G. Bhat, H. Liu, R. Rovira, 2022. An Ecosystem Service Approach to Assessing Agro-Ecosystems in Urban Landscapes. Land, 11, 469. https://doi.org/10.3390/land11040469*
16. ^*E. Holt-Gimenez, A Foodie's Guide to Capitalism: Understanding the Political Economy of What We Eat. Monthly Review Books, 2017, New York*
17. a, b*M.A. Altieri, C. I. Nicholls, Urban Agroecology: designing biodiverse, productive and resilient city farms, Agro Sur 46(2) (2018) 49-60, DOI:10.4206/agrosur.2018.v46n2-07*
18. ^*E. Greenberg-Bell, C. Baglien, D. T. Schwei, K. Havey, Minneapolis Urban Agriculture Survey 2019. Minneapolis, MN: Homegrown Minneapolis. (2019)*
19. ^*J.A. Nicklay, K.V. Cadieux, M.A. Rogers, N.A. Jelinski, K. LaBine, G.E. Small, Facilitating Spaces of Urban Agroecology: A Learning Framework for Community-University Partnerships. Frontiers in sustainable food systems 4:143 (2020). doi: 10.3389/fsufs.2020.00143*
20. a, b*F. Martellozzo, J.L. Landry, D. Plouffe, V. Seufert, P. Rowhani, N. Ramankutty, Urban agriculture: A global analysis of the space constraint to meet urban vegetable demand. Environmental Research Letters 9(6), 1-8 (2014) https://doi.org/10.1088/1748-9326/9/6/064025*
21. ^*M.G. Badami, N. Ramankutty, Urban agriculture and food security: A critique based on an assessment of urban land constraints. Global Food Security 4, 8-15 (2015) https://doi.org/10.1016/j.gfs.2014.10.003*
22. ^*H. De Zeeuw, R. van Veenhuizen, M. Dubbeling, The role of urban agriculture in building resilient cities in developing countries. The Journal of Agricultural Science 149(S1), 153-163 (2011) https://doi.org/10.1017/S0021859610001279*
23. ^*L.J. Pearson, Sustainable urban agriculture: Stocktake and opportunities. Int. J. Agric. Sustain. 8, 7–19 (2010)*
24. ^*A. Siegner, Urban Agroecology: An essential resource for times of crisis and beyond, Policy Brief, The Berkeley Food Institute (BFI), 2021, University of California, Berkeley*
25. ^*N. Clinton, M. Stuhlmacher, A. Miles, N. U. Aragon, M. Wagner, M. Georgescu, C. Herwig, P. Gong, A Global Geospatial Ecosystem Services Estimate of Urban. Agriculture. Earth's Future 6(1), 40-60 (2018) https://doi.org/10.1002/2017EF000536*
26. ^*C.M. Deh-Tor, Food as an urban question, and the foundations of a reproductive, agroecological, urbanism, in TORNAGHI C., DEHAENE M. (eds.), Resourcing an agroecological urbanism. Political, transformational and territorial dimensions, London: Routledge; 2021, Ch. 1, pp. 12-33*
27. ^*S. Mandal, M. Kleinke, N. Chowdhury, N. Bepary, Accessing newly accreted land by the poor farmers: Innovations towards food security in Bangladesh. TROPENTAG 2015, Management of land use systems for enhanced food security – conflicts, controversy and resolutions September 16 – 18, 2015, Humboldt-Universität zu Berlin, Germany.*
28. ^*C. Hammelman, E. Shoffner, M. Cruzat, S. Lee, Assembling agroecological socio-natures: a political ecology analysis of urban and peri-urban agriculture in Rosario, Argentina, Agriculture and Human Values 39:371–383 (2022), https://doi.org/10.1007/s10460-021-10253-7*
29. ^*R. Krishnamurthy, Sandbar cropping in Bangladesh, https://permaculturenews.org/2014/04/25/sandbar-cropping-bangladesh/, 2014*
30. ^*N.I. Chowdhury, Sandbar cropping in Bangladesh, an innovative technology solution for millions, http://www.aidforum.org/food-security/sandbar-cropping-in-bangladesh-an-innovative-technology-solution-for-millio, 2016.*
31. ^*D. Pimental, Energy flows in agricultural and natural ecosystems, Options, CIHEAM – Options Mediterrannes, 1983, 125-136*
32. ^*K. Rahman, I. Reza, Accessing and Retaining access to the sandbars by the extreme poor: Experiences from the practical action project, Extreme poverty research group (EPRG), Chars livelihood programme, 2012, SHIREE – Working paper 9, Bangladesh.*
33. ^*K.S. Randhawa, T. Remigius, Market around us, In Sahi, M. N. & Kaur, M. (Eds.), 'India and the modern world' (36-39). 2015, New Delhi: Evergreen Publications.*
34. ^*E. Ashraf, M.B. Hossin, S. Ito, A. Shonchoy,. Impacts of periodic floods in River Islands of North-West Bangladesh: Background and Research Questions, Interim Report, Institute of Developing economies, Japan External Trade Organisation, 2013.*

35. ^J. Prasad, A. Prasad, Indian Agricultural Marketing: Emerging Trends & Perspectives, Mittal Publications, 1995, pp 268, ISBN 8170996155

Declarations

Funding: Dr. B.R. Ambedkar University Delhi
Potential competing interests: No potential competing interests to declare.