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Assessment of Water Quality and Fish Diversity in the Sai River, Jaunpur

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Abstract: Biodiversity is key of survival and maintenance of food web and food chain of the flora and fauna. In another words we can say that biodiversity is life support system of living being. Proper maintenance of biodiversity is a key for survival of life on earth. Each animal is linked with another through either food chain or food web. Recently proposed by different ichthyologist and newer edition of the book roughly estimated that huge number of fishes are described recently and the number grown around 32000 to 34000 of recognized and well described fish species globally. Fishes are prominent source of proteins and minerals for humans. In present study we have validated that 43 different species are occurred in Sai River of Jaunpur. Physico-chemical parameters as like TDS, DO and CO_2 measured throughout the year.

Introduction

Biodiversity plays most important role in maintenance of food web and food chain of the flora and fauna. In another words we can say that biodiversity is life support system of living being. Proper maintenance of biodiversity is a key for survival of life on earth. Each animal is linked with another through either food chain or food web. Enormous number of fish population is studied in different lentic and lotic ecosystem of fresh water in India. But in recent time diversity and population of native fishes are decreasing at alarming level. Each species represents a significant role in ecosystem and their genetic makeup can play a role in evolutionary point of view. So, study the role of each species of fishes must be escalated and it requires proper conservation of that native species at in situ level. In 1994 Joseph S. Nelson describe roughly 285000 of fish species worldwide in his book Fishes of the World. But recently proposed by different ichthyologist and newer edition of the book roughly estimated that huge number of fishes are described recently and the number grown around 32000 to 34000 of recognized and well described fish species globally (Froese, R. and Pauly, D. 2018). In these fish species around 2200 to 2500 fish species are present in Indian Continent. Recent fish inventories represent that around 3150 to 3900 of different fish species are present in Indian Water. If talk about freshwater fishes that includes river, lakes and ponds around 1000 native fish species are present in India (NBFGR 2020). As reported almost 8.9% of known different fish species globally (Baker et al., 2008) and around 11.72% of worldwide fish diversity represented from Himalayan range, Eastern and Western Ghats, northern plains (Lakra et al., 2010). Freshwater ecosystem is highly affected with biodiversity loss in 21st century (Sala et al., 2000; Bowker et al., 2000).

As the Sai River originate from Bhijwan Jheel of Hardoi District of Uttar Pradesh and Sai River flows through Lucknow, Sultanpur and Jaunpur where river merges with Gomati River. Almost 563 kilometre stretch approximately flows in Uttar Pradesh. Sai River bank follows different types of industries established at River bank of Sai, household sewage effluents flow and agricultural waste in river stream directly that affect the natural habitat including flora and fauna of

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the river (Dudgeon et al.2005; Arthington and Welcome 1995; Arthington AH et al., 2010; De Silva and Abery 2007, Botle A et al., 2022). Globally in fish production India's rank is overall at the third position and when we talk about the gross domestic production (GDP), it represents about approximately 1.07% of total GDP. Fisheries industries also play a major role in case of rural employment and fishes provides proper protein rich nutrient to the human population (CFMRI Kochi, 2022; Kumar A and Pathak H, 2024). Due to the increased anthropogenic activity near the bank of Sai River also affect the water quality of the river. Different parameters used for the measurements of water quality as like biological oxygen demand (BOD), Carbon di Oxide (CO_2) level, pH level of the water plays a critical role for the development and growth of living being (Flora and Fauna).

2. Material and Methods:

2.1. Area of Study

For the study we selected the urban and rural area which is one of the most polluted and overpopulated areas of Jaunpur. The urban and rural area is spread over about the stretch of 60km of river bank and in Jaunpur, Rajghat Sai River merges with Gomati River. Sai River before merging with Gomati River, water of River Sai affected by different types of industries like jewellery processing units, steel processing industries, chemical units, paints, pharmaceutical units, textile industries etc. Jaunpur district is situated approximately between 25°22'30" and 26°10'00" north latitude and 82°06'00" and 83°00'00" east longitude. Weather condition of Jaunpur as for temperature concern it ranges from 4°C to 45°C. Average Rainfall in Jaunpur is approximately 1,098 millimetres (42 inches) in the area (data shown by the Krishi Vigyan Kendra of Jaunpur), rain occurs mostly during the monsoon season (June to September). The place experiences the onset of the monsoon in the month of June and experiences monsoon till the end of September. The average temperature approximately is 25.7 °C (78.2 °F) and temperature range varies from 04 °C to 45 °C.

Water Sampling: We collected the water from the river throughout the year for evaluation of variation of weather condition. Water sample were collected directly in to the presterilized glass bottles to avoid any contamination. Water sampling is done from three different sites (Site Ist is near the bridge of Sikrara, Site IInd is the Ram Dayal Ganj and IIIrd site is near the Jalalpur bridge of Sai River). After the collection of water sample from all the three sites were taken to the lab for further analysis. The samples were analyzed immediately for the parameters as like dissolved oxygen (DO), dissolve Carbon di Oxide (CO_2), pH and total dissolved solids (TDS). After the collection of water samples from selected sites analysed immediately in laboratory.

Physico-chemical parameter of water:

Utilization of Oxygen present in water by the living organisms (both prokaryotes and eukaryotes) in aerobic condition at specific temperature is known as biological oxygen demand. At normal condition BOD level should be 3 mg/L or lower than 3 at 20 ºC for drinking water (as per CPCB guidelines 2007-08). Total dissolved solids (TDS) were measured onsite by an IONIX TDS meter (Wetzel and Likens, 2000) at the site of water collection. For the calculation of dissolved Carbon di Oxide (CO_2) level measured using a standard of Phenolphthalein as indicator. For measurement of dissolve oxygen in water simple titrimetric method used. For measurement of DO simple standard sodium thiosulphate solution used until the yellow colour of free Iodine is faded out (Pale yellow colour). Used 1 ml of starch solution and started the titration until the blue colour disappear and the solution became transparent, and measure the sodium thiosulphate volume which shows DO in mg/L.

Results and Discussion:

As the fishes collected from all the three pre specified places and taken for the specific identification of species. For identification of the fishes, we used the manuals and keys proposed by Talwar & Jhingran (1991) and Jayaram (1999). The colour of the fishes, banding patterns on the skin of fishes, morphometric and meristic characters were identified and fin formulas of each species of the collected indigenous and exotic fishes were derived as the discussed by Srivastava in his studies (1980 & 1988). As the data shown in table (1), there are 43 different fish species were collected from the Sai River in Jaunpur. Fishes collected from the River Sai stored in 10% of formalin solution for further identification

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and save them for degradation. As data of the fishes shown in present study, most the fishes are collected from the fisherman just because of their high value of protein content and multiple essential minerals shown by the fish meat as like *Catla catla, Labeo rohita, Clarius batrachus, Mystus seenghala, Labeo calabasu*. *Wallago attu, Ompok pabda* and *Ailia coila* are recorded as threatened species as per IUCN data. There are two exotic fishes *Ctenophyran godonidellus* and *Hypophthalmich thysmolitrix* occurred in Sai River.

S. No.	Local Name	Scientific name	Fin formulae	Current Population Status
1	Suhia	*Gudusia chapra* (Hamilton, 1822)	D 14-15(3/11-12); P 13; V 8; A 22-24; C 17	Decreasing
2	Patara	*Notopterus notopterus* (Pallas, 1769)	D 8(1/7); P17; V 6; A100; C 19	Unknown
3	Bhakur	*Catla catla* (Hamilton, 1822)	D 18-19(3/15-16); P 19; V 9; A8(3/5); C 19	Unknown
4	Nain	*Cirrhinus mrigala* (Hamilton, 1822)	Diii-iv12-13; P I 17; Aiii 5; V I 8	Stable
5	Rewa bata	*Cirrhinus reba* (Hamilton, 1822)	D2/9; P16; V9; A2/6; C19	Stable
6	Grass carp	Ctenopharyngodon idella (Valenciennes, 1884)	D 10; P18; V 9; A 10-11; C 26-32-	Unknown
7	Silver carp	Hypophthalmichthys molitrix (Valenciennes, 1844)	D10-11; P20-21; A 14-15; V 8	Unknown
8	Dendua	Esomus danricus (Hamilton, 1822)	D 8-9(2/6-7); P 11-12; V 8; A9(3/6)	Stable
9	Bata	Labeo bata (Hamilton, 1822)	D11-12(2-3/9-10); P 18; V 9; A 7(2/5); C 19	Unknown
10	Karaunchi	Labeo calbasu (Hamilton, 1822)	D17(3/14); P19; V 9; A7(2/5); C 19	Unknown
11	Kursi	Labeo gonius (Hamilton, 1822)	D16(3/13); P 17; V 9; A 7 (2/5); C19	Unknown
12	Rohu	Labeo rohita (Hamilton, 1822)	D16(3/13); P 17; V 9; A7 (2/5); C 19	Unknown
13	Gurda	Osteobrama cotio (Hamilton, 1822)	D11(2/9); P 14-15; V 10; A 33-35(2/31-34); C 19	Unknown
14	Chalhawa	Salmostoma bacaila (Hamilton, 1822)	D2/7-9; P12-13; V 9; A 2/13-15; C 19	Stable
15	Sidhari	16 Puntius sarana (Hamilton, 1822)	D3/8-9; P 15-16; V 8-9; A 3/5; C19	Unknown
16	Dendua	*Rasbora daniconius* (Hamilton, 1822)	D 2/ 7; P 15; V. 9; A 2/ 5; C 19	Unknown
17	Bagha	*Botia lohachata* (Chaudhuri, 1912)	D2/ 9; P 13-15; V 8; A 2/ 5; C 19	Unknown
18	Nakati	*Lepidocephalichthys guntea* (Hamilton, 1822)	D 2/ 6; P 8; V 7; A 2/ 5; C 16	Unknown

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19	Pabda	*Ompok* *Ompok pabda* (Hamilton, 1822	D4-5; P 1/ 11-13; V 1/ 6-7 A 2/ 48-54	Decreasing
20	Padhani	*Wallago attu* (Bloch et Schneider, 1801)	D 5; P1/14; V 10; A 4/82; C17	Decreasing
21	Tengana	*Mystus seenghala* (Sykes, 1839)	D1/7/0; P 1/ 9; V 6; A 3/ 8-9; C 19-21	Unknown
22	Tengra	*Mystus tengara* (Hamilton, 1822)	D1/ 7/0; P 1/ 8; V 6; A2-3/9-10; C19	Unknown
23	Tengara	*Mystus vittatus* (Bloch, 1794)	D 1/ 7/0; P 1/8; V 6; A 2/9; C17	Decreasing
24	Dariai Tengar	*Mystus cavasius* (Hamilton, 1822)	D1/ 7/0; P 1/9 8; V 6; A 3-4/7-8; C 16	Decreasing
25	Tengan	*Mystus aor* (Hamilton, 1822)	D 1/ 7/0; P 1/10; V 6; A 3/10; C 17	Decreasing
26	Hunna	*Rita rita* (Hamilton, 1822)	D 1/ 6; P 1/ 10; V 8; A 4/9; C 19	Decreasing
27	Gonch	*Bagarius bagarius* (Hamilton, 1822)	D1/6/0; P 1/12; V6; A 3/10; C 17	Decreasing
28	*Kosi nangra*	*Nangra nangra* (Hamilton, 1822)	D 1/ 6; P 1/ 8; V 6; A 11-12; C 18	Stable
29	Baghi	*Gagata cenia* (Hamilton, 1822)	D8 (2/ 6) 1/0; P 1/ 8-9; V 1/ 5; A 3/ 10-11; C 19	Unknown
30	Patasi	*Ailia coila* (Hamilton, 1822)	D0; P I 13-14; V 6; A 72-75; C 19	Decreasing
31	Karahi	*Clupisoma garua* (Hamilton, 1822)	D1/ 7; P 1/11; V 6; A 3/29; C 17	Decreasing
32	Banjhoo	*Eutropiichthys vacha* (Hamilton, 1822)	D I /7; P 1/ 15-17; V 6; A 3/45; C 17	Decreasing
33	Singhi	*Heteropneustes fossilis* (Bloch, 1794)	D 6; P 1/7; V 6; A62-66; C19	Stable
34	Mangur	*Clarias batrachus* (Linnaeus, 1758)	D 65-70; P1/8; V6; A47; C17	Unknown
35	Hunra	*Rhinomugil corsula*	D 4/1/8; P 5; V1/5;	Unknown

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		(Hamilton, 1822)	A3/8-9; C15	
36	Kauwa	*Xenentodon cancila* (Hamilton, 1822)	D 16-17; P 11; V 6; A 17; C 15	Unknown
37	Souri	*Channa marulius* (Hamilton, 1822)	D 46; P 18; V 6; A 32; C 12	Unknown
38	Girohi	*Channa punctata* (Bloch, 1793)	D 29-30; P 16-17; V 6; A 20-22; C 12	Unknown
39	Souri	*Channa striata* (Bloch, 1793)	D 41-43; P 16-18; V 6; A 24-25; C 14	Unknown
40	Sumha	*Badis badis* (Hamilton, 1822)	D 16/ 7-10; P 12; V 15; A 3/7; C 16	Unknown
41	Kawai, Koi	*Anabas testudineus* (Bloch, 1792)	D 17/9-10; P 15; V1/5; A 10-11; C16	Unknown
42	Khosti	*Trichogaster lalius* (Hamilton, 1822)	D 15-17 / 7-10; P 10; V 1; A 17-18/ 13-14 C15	Unknown
43	Bam	*Mastacembelus armatus* (Lacepède, 1800)	D 37-39/78-82; P 21-27; A 3/ 75-78	Unknown

Table 1. Fish species richness, abundance and biodiversity indices of fish species of River Sai at Jaunpur, India.

Total dissolved solids (TDS), carried out throughout the year to know the range of TDS in Sai River water. Maximum TDS shown during the monsoon season ie., during July to September due to maximum inflow of rainy water through the neighbouring areas of rivers. During winter season TDS remain almost similar, but during summer TDS is increased in comparison to winter because inflow of freshwater in river is slow down while household waist flow increased in river (Fig. 1)

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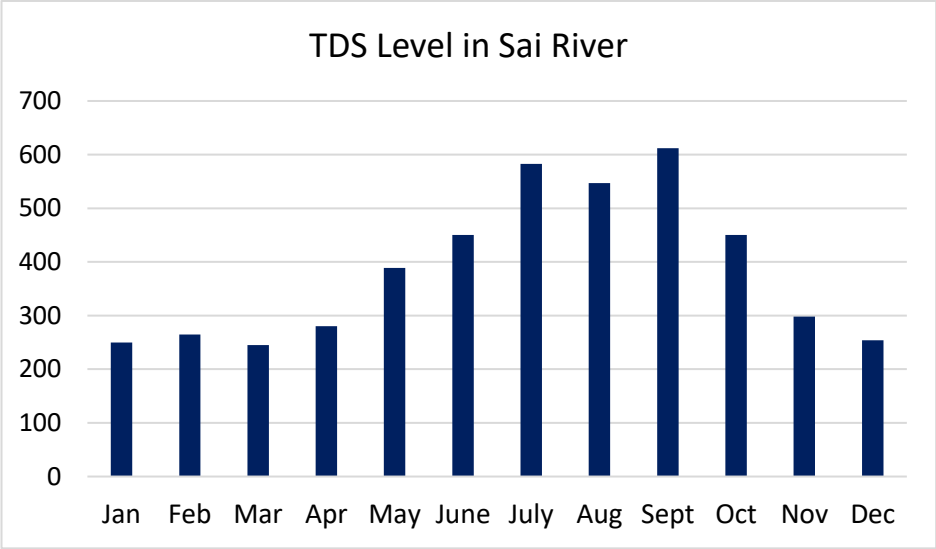
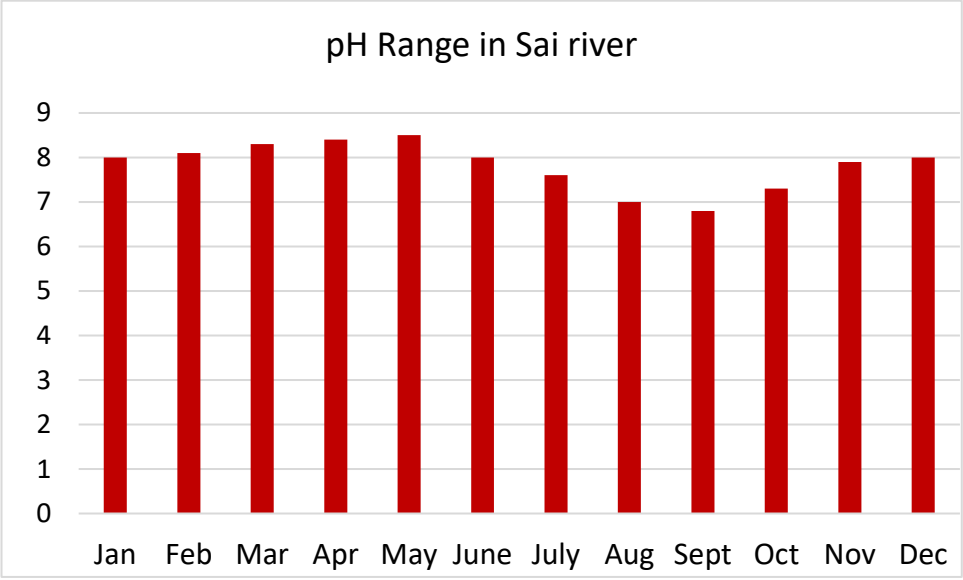


Fig. 1. Total Dissolved Solids Measured throughout the year.

pH level of the Sai River water measure in different months as the sample measured TDS and same water sample were used for pH measurement in lab using pH meter. pH ranges from 6.8 to 8.5 and it varies during different season. As like during winter and pre monsoon pH remain basic ie., upto 8 or higher while during monsoon pH of the water became acidic. During summer due to high accumulation of waste and minimum inflow of fresh water in river pH goes maximum. During rainy season pH remain acidic due to high fresh water inflow in river. During winter pH varies between 7.4-8. pH remains acidic during monsoon, possible reason for the same because during rainy season free CO_2 dissolved in water and formed carbonic acid and pH goes below 7 (Fig. 2).



Dissolved Oxygen level in Sai River varies between 0.9-9 mg/L as shown in (fig .3). The level of DO varies as per the weather condition and inflow of water in river. Maximum level of Dissolved oxygen recorded during monsoon season because fresh water inflow in river increased that increased the DO in water. During summer minimum level of DO ie., o.9 recorded, possible explanation of the DO is minimum freshwater flow in summer and sewage inflow increased in the summer that causes increased the biological oxygen demand. Due to polluted water in summer season microbial and bacterial growth increased and BOD became high and DO became lowest.

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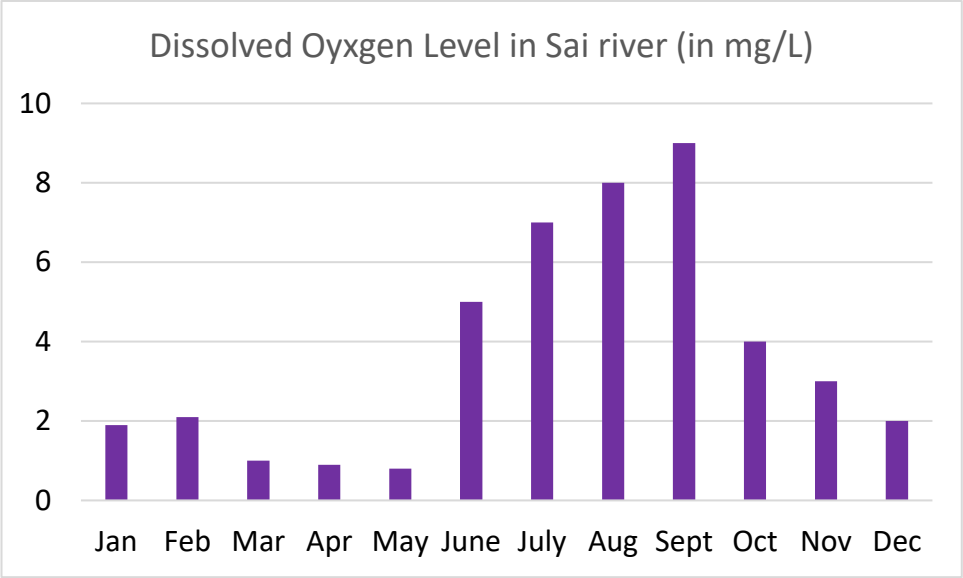

So, for in conclusion, we can say that proper sewage treatment near populated area is must for the household sewage. Proper treatment of sewage water will improve water quality of the Sai River that will be good for maintenance of biodiversity and species richness in river. Industries at the River bank of Sai and their effluents will be proper treated before water flow form the industries in river.

References:

1. Arthington AH, Welcome RL. 1995. The conditions of large river systems of the world. In Conditions of the World's Aquatic Habitats, Proceedings of the World Fisheries Congress, Theme 1, NB Armantrout (ed.), Science Publishers: Oregon, USA; 45–75.
2. ARTHINGTON, A.H., NAIMAN, R.J., McClain, M.E. and NILSSON, C. (2010), Preserving the biodiversity and ecological services of rivers: new challenges and research opportunities. Freshwater Biology, 55: 1-16. https://doi.org/10.1111/j.1365-2427.2009.02340.x
3. Baker, A. C., Glynn, P. W. and Riegl, B. 2008. Climate change and coral reef bleaching: An ecological assessment of long-term impacts, recovery trends and future outlook. Estuar. Coast. Shelf Sci., 80(4): 435-471. doi:10.1016/j. ecss.2008.09.003.
4. Botle A, Salgaonkar S, Tiwari R, Ambadekar S, Barabde GR (2022) Brief status of contamination in surface water of rivers of India by heavy metals: a review with pollution indices and health risk assessment. Environ Geochem Health 45(6):2779–2801. https://doi.org/10.1007/s10653-022-01463-x
5. Bowker G.C., 2000. Biodiversity data diversity. Social studies of science, 30: 643–683.
6. CMFRI, Kochi. "State Specific Strategies for Doubling Farmers Income-2022." (2020).
7. De Silva, S. S., Abery, N. W., & Nguyen, T. T. (2007). Endemic freshwater finfish of Asia: distribution and conservation status. *Diversity and Distributions*, *13*(2), 172-184. Nelson J.S., 1994. Fishes of the World. John Wiley and Sons, New York, 600 pp.
8. Dudgeon D, Arthington AH, Gessner MO, et al. Freshwater biodiversity: importance, threats, status and conservation challenges. Biological Reviews. 2006;81(2):163-182. doi:10.1017/S1464793105006950
9. Froese, R. and Pauly, D. 2018. FishBase. World Wide Web electronic publication. www.fishbase.org, version (02/2018).
10. Jayaram K.C., 1999. The freshwater fishes of the Indian region. Narendra Publ. House, New Delhi, 551 pp.
11. Kumar, A., & Pathak, H. (2024). State of Indian agriculture. *National Academy of Agricultural Sciences, New Delhi, p xvi*, *92*, 59

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This article is openly accessible and reusable with proper attribution.

12. NBFGR 2020. Annual report 2020, ICAR-National Bureau of Fish Genetic Resources, Lucknow, Uttar Pradesh, India, 160 pp.
13. Srivastava G.J., 1980. Fishes of U.P. & Bihar, Vish wavidyalaya Prakashan, Varanasi, India, 204 pp.
14. Srivastava G.J., 1988. Fishes of U.P. & Bihar. 3rd Edi tion, Vishwavidyalaya Prakashan, Varanasi, India, 163 pp.
15. Talwar P.K. & Jhingran A.G., 1991. Inland fishes of India and adjacent countries. Vols. 1-2. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, 1097 pp.
16. Lakra, W. S., Sarkar, U. K., Gopalakrishnana, A. and Khatirvelpandian, A. 2010. Threatened freshwater fishes of India. ICAR-National Bureau of Fish Genetic Resources, Lucknow, Uttar Pradesh, India.
17. Sala, O. E., Chapin, F. S., Armesto, J. J., Berlow, R., Bloomfield, J., Dirzo, R., Huber-Sanwald, E., Huenneke, L. F., Jackson, R. B., Kinzig, A., Leemans, R., Lodge, D., Mooney, H. A., Oesterheld, M., Poff, N. L., Sykes, M. T., Walker, B. H., Walker, M. and Wall, D. H. 2000. Global biodiversity scenarios for the year 2100. Science, 287: 1770-1774.

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