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A Bibliometric Analysis of Highly Cited papers on Floodplain Research in Science Citation Index Expanded

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ABSTRACT:

Bibliometric examination of exceptionally cited papers of a nation can give fascinating bits of knowledge concerning creators, nations, cooperation designs and even valuable proposals for future research approach. The point of the present review is to break down the highly cited papers on floodplain research. SCI database of the web of science center accumulation of Thomson Reuters is utilized to recover and related bibliographic records. Gathering and renaming of nations and landmasses with variations have been finished. The most profitable nations and mainlands, collaborating partners and citations of the creators are inspected. Comes about uncovered that all the profoundly cited papers on floodplain explore did not get references in the early decades after production. Co-authored papers get a larger number of references than single one aside from nations. USA and Europe are the most beneficial territory if there should arise an occurrence of aggregate and single nation productions. The range of utilization in floodplain research has moved from hypothetical to the specialized and productive bit.

KEYWORDS: Floodplain, Bibliometrics, Citation Impact, Highly Cited Articles, Scientometrics

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INTRODUCTION

Highly cited papers have been introduced in journal citation studies¹ and in clinical research². They have given intriguing and valuable experiences into which creators, papers, and themes impact the exploration calling after some time³. Heavily cited papers were considered as 'great citations'⁴. Different reviews have endeavored to distinguish and examine high cited papers in the Web of Science (WoS) classifications, for instance, in dermatology⁵, ecological and word related well-being⁶, obstetrics and gynecology⁷, water assets⁸, chemical engineering⁹, natural sciences¹⁰, energy¹¹, production of a nation^{12,13}. Bibliometric investigations of exceptionally cited articles¹⁴ and surveys¹⁵ in the Science Citation Index Expanded (SCI-Expanded) were as of late directed to uncover fascinating examples of citation life. Citation life cycles of most cited papers were uncovered to give more definite reference data and its effect¹⁶. In a few occurrences, specialists concentrated on exceedingly cited papers of specific nations, for example, India and China, and it was inferred that the following stride is for analysts in these two nations to compose papers that will be cited significantly, more frequently than now¹⁷.

A floodplain is a smooth land surface nearby a stream channel, framed by the present river through different procedures. Floodplains are perplexing physical elements flanking streams in plaited, winding, or anastomosing comes to. They are highly unique in the regular state since floods revamp their morphology at different spatial scales^{18,19}. Floodplains are consistently built and decimated by fluvial procedures. Essentially three sorts of stores are found in the floodplain, i.e. Valley edges, channel store, overbank stores. Be that as it may, on account of Bhagirathi Basin, floodplain, for the most part, has three sorts of stores, point bars, overbank stores and channel fills. Floodplain materials are fundamentally set around the vertical and parallel speeding up of the channel. These are the consequence of the subsidence of stream bringing about the absence of fitness and in this way, bigger particles are dropped from the bed stack. Floodplains might be assembled into four classifications²⁰, i.e. Bordering flood plain (Bhagirathi basin in India), Internal basin plain, Coastal floodplain, and Proglacial Sandur plain. Primary floodplain elements which are seen in Bhagirathi basin is normal levees, back swaps, meander, scroll, meander bends and cutoffs, point bars and shoal and so on. Floodplain statement is an essential procedure in the capacity and cycling of residue, supplements, and contaminants in the river basin^{21,22,23}. The patterns, sums, and qualities of floodplain sedimentation have been considered widely²⁴. As for the residue related contaminants, particularly affidavit of substantial metals got the consideration of various creators^{25,26}. Most reviews on the inconstancy in overbank testimony concentrated on little streams^{27,28}, concerned recorded floodplain deposits²⁹ or utilized modeling^{30,31}. However, experimental reviews on contemporary

sediment testimony are as yet expected to pick up understanding into the key factors that decide spatial changeability of floodplain affidavit and for alignment and approval of floodplain statement models³². On-premise of floodplain research in India, some scientist likewise centered around the bank disintegration issue and nature of channel moving of stream Bhagirathi and its effect on humankind^{33,34}. Some likewise talked about morphodynamic, hydrodynamic change and the issue of the flood in stream Bhagirathi^{35,36}. Some scientist accumulated data about a specific zone as a contextual analysis and demonstrated the way of disintegration and force of flood of that territory^{37,38}. Some scientist examined the avulsion character of the river over the Bhagirathi basin for the duration of the time and its impact³⁹.

The motivation behind this article was to recognize and break down profoundly cited papers on floodplain research about in the SCI-Expanded database from 1970 to 2015. With all affectionate mainland system and high reliance on worldwide joint effort, it gives a great contextual investigation on the impact of initiation and cooperation on high cited papers. The annual creation, most cited articles, contributing landmasses, writers and nations, and different pointers were utilized as a part of this bibliometric research.

METHODOLOGY

Bibliographic information for the review has been gathered from SCI-EXPANDED of Web of Science (WoS; Thomson Reuters). A pursuit was led with the expression "Floodplain" in the delivery field and confined to articles as it were. At first, 8543 articles were recognized, which were distributed in the vicinity of 1970 and 2015 (date of inquiry: 26th July 2016). At that point, channel to profoundly cited distributions, i.e. articles with TC2015 of ≥ 80 was chosen^{40,41}. This yielded 3332 articles which were utilized for further examination. All record information was downloaded from the SCI-Expanded database into a Microsoft Excel 2010 sheet. All examinations were physically figured without any other person laid out figurines and certain limits by Microsoft Excel 2010 using the markers.

Furthermore, pointers C2015 - number of citations gotten by a paper in the current year 2015, and C0 - number of citations gotten by a paper in the distribution year were utilized to describe highly cited papers. Assist, TCPY - a proportion between an aggregate number of references and number of years since the date of distribution to 2015 was additionally utilized. In SCI-EXPANDED, the Corresponding creator is named as reprint creator and is taken as the comparing creator. In a single writer article, the writer is named both the principal writer and the corresponding writer. The nation in creators, affiliations are checked and assembled physically⁴².

RESULTS AND DISCUSSION

General profile

An aggregate of 3332 highly cited papers ($TC \geq 80$) from floodplain research was distinguished in the SCI-EXPANDED database from 1970 to 2015. All were distributed in English. Ho and his coresearchers have utilized the marker references per production ($CPP = TC_{year}/TP$) by decades. Figure 1 demonstrates that the exceptionally cited papers on floodplain research were distributed amid 1970s–2010s. The greater part of the highly cited articles (76.2%) was distributed in the vicinity of 1990's and 2000's. The most noteworthy number of high cited papers was distributed in the 2000s with 45.9% of aggregate articles and least was mid-1970s. By and large, the pinnacle of CPP was found in the 1980s. Bank-full discharge of river by William, 1978 was the oldest high cited article here with $TC=171$.

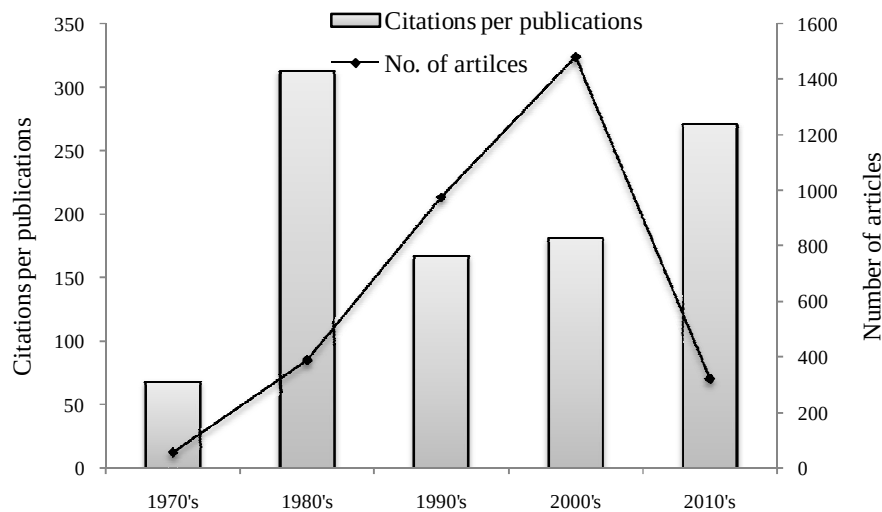


Fig 1. Number of articles and citations per publications by decades

Article Characteristics

As delineated in Table 1, floodplain research turned out to be progressively collaborative over the period contemplated. The mean number of writers per article expanded from 2.3 to 2.5 and mean paper length ascended from 18.2 to 26.7 pages in the vicinity of 1970's to 2010's. After 1980's the paper is dropped narrowly but after that it rose again. The number of bibliographic sources per articles also increased from 21-568 citations, which was typical of research articles in the early 2000s, to 137 citations per article after the decades 2010's.

Table 1. Characteristics of floodplain research journal articles

Decades	TP	AU	AU/TP	PG	PG/TP	CP (%)
1970's	56	132	2.3	1021	18.2	21 (37.5)
1980's	388	912	2.3	10351	26.7	123 (31.7)
1990's	976	2231	2.3	18373	18.8	395 (40.5)
2000's	1481	3341	2.2	26342	17.8	568 (38.3)
2010's	321	718	2.5	6741	21	137 (42.7)

TP= No. Of total articles, AU= No. Of authors; PG= No. Of pages; CP= No. Of international collaborative articles

Research focus on floodplain

Measurable investigation of the recurrence of key terms in article titles, authors' keywords, and KeyWords Plus points of interest of research advance and demonstrates the heading of science in a research field. Distribution of title words, authors' keywords, and KeyWords Plus various periods can be utilized to determine research core interest.

A sum of 176 title words showed up in no less than 56 research articles on floodplain inquire about amid the review time frame. The main 5 most incessant title words were: "flood" (610; 18.9% of 3222 articles), "floodplain" (538; 16.7%), "wetland" (327; 10.1%), "bathymetry" (263; 8.2%), "flood-pulse" (192; 5.9%). The analysis of authors' keywords uncovered 181 keywords that showed up in no less than 39 articles. The main 5 most successive terms in authors' keywords were: 'restoration' (407; 12.6%), 'managemet' (382; 11.8%), 'flood' (317; 9.8%), 'fisheries' (274; 8.5%), 'ecology' (227; 7%). Utilizing KeyWords Plus, 147 terms showed up in no less than 27 articles. With respect to the author keywords, the most regular term was 'flood' (537 articles; 16.6% of all articles) followed by 'sedimentation' (430; 13.3%), 'restoration' (377; 11.7%), 'stream' (329; 10.2%), 'channel' (267; 8.3%).

Accordingly, the most regular KeyWords Plus terms were more changed than the top title words, however, less different than the top authors' keywords. The term 'flood'showed up in the main 5 categories crosswise over title words, authors' keywords and KeyWords Plus. Two terms, 'floodplain' and 'wetland', were found among the top 5 for title words and authors' keywords. The simultaneous appearance of terms 'restoration' and 'management' in title category demonstrating the objective of floodplain investigate towards human benefit.

Subject categories, discussion categories and Journal of publication

As portrayed in Table 2, no less than 9 journals from 13unique publishers published at least 100 articles on floodplain research amid the reference time frame. The main 4 journal publishers were Wiley, Taylor and francis, Springer and Elsevier BV. The decade wise publication of this

journal also shows in fig 2., which shows 2000's have much more publications rather than other decades of top journals.

Table 2. Top journals of floodplain research with TP $\geq$ 100

Name of Journals	IF ₂₀₁₅	TP (%)
River Research and Application	1.98	533 (16.5)
International journal of River Basin management	2.98	461 (14.3)
Journal of Flood Risk Management	1.377	408 (12.6)
Geomorphology	2.577	361 (11.2)
Journal of Hydrology	3.043	287 (8.9)
Water resource research	3.709	203 (6.3)
Journal of Geophysical Research	3.44	188 (5.8)
Earth Science Process and Landforms	2.768	113 (3.6)
Hydrological Process	2.366	91 (2.8)

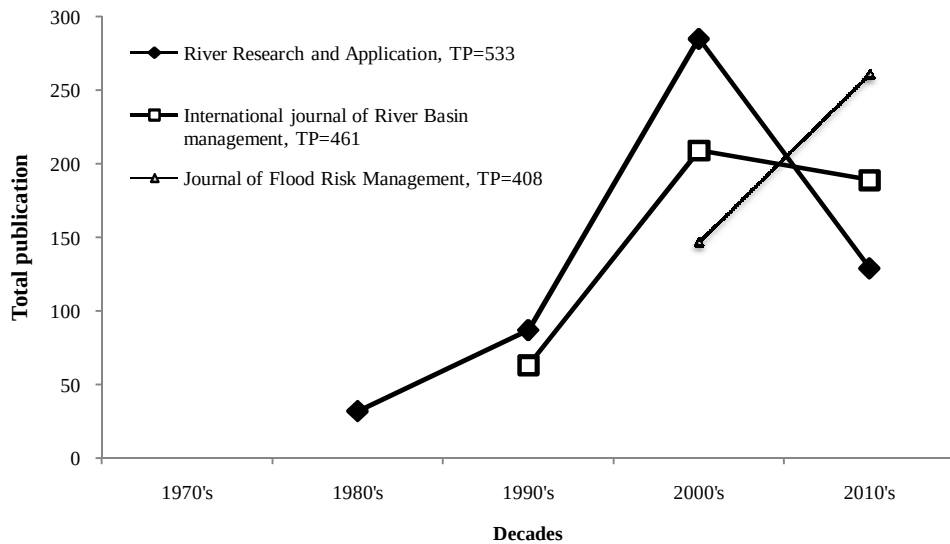


Fig. 2. Decade wise distribution of Top 3 journals

In Table 3, twelve branches of subject areas added to greater than 100 articles. The top branches of subjects were Multidisciplinary geosciences, Physical Geography and Environmental Science. Almost 45.6% of the research was directed in the territories of this trio. Fig 3, shows the increasing growth of first two category in first two decades rather than environmental science. After that, environmental science decreased its growth by time followed by Geoscience and geography, which emerges the use of floodplain in technical place rather than natural one.

Table 3. Top 10 Web of Science category in floodplain research with TP≥100

Web of Science Category	TP (%)
Geoscience, multidisciplinary	631 (19.6)
Geography, physical	537 (16.6)
Environmental Science	303 (9.4)
Engineering, environmental	278 (8.6)
Engineering, mechanical	213 (6.6)
Fluid, mechanics	146 (4.5)
Ecology	130 (4)
Water Resource	117 (3.6)
Biodiversity conservation	103 (3.2)
Fisheries	93 (2.8)

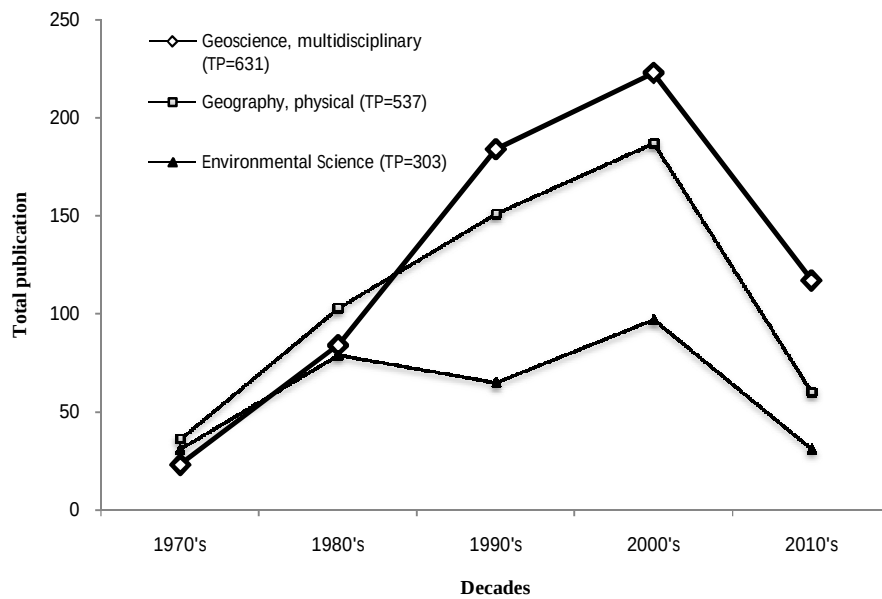


Fig 3. Decade wise distribution of Top 3 Web of science category

There were different type of discussion categories for the floodplain research during this period as depicted in table 4. The top discussion categories are Flood and related problem, Floodplain restoration and management, Ecological character, Modelling and Geological settings. Nearly half of the research was conducted in the discussion areas of Flood and related problem and Modelling (Fig 4). The image shows that floodplain modelling is most discussed issues now a days. But the ecological character of floodplain loose peoples attention day by day.

Table 4. Top discussion category in floodplain research with TP $\geq$ 100

Discussion Topic	TP (%)
Flood and related problems	633 (19.6)
Modelling	591 (18.3)
Ecological Character	497 (15.4)
Floodplain restoration and management	443 (13.7)
Geological settings of floodplain	263 (13.2)

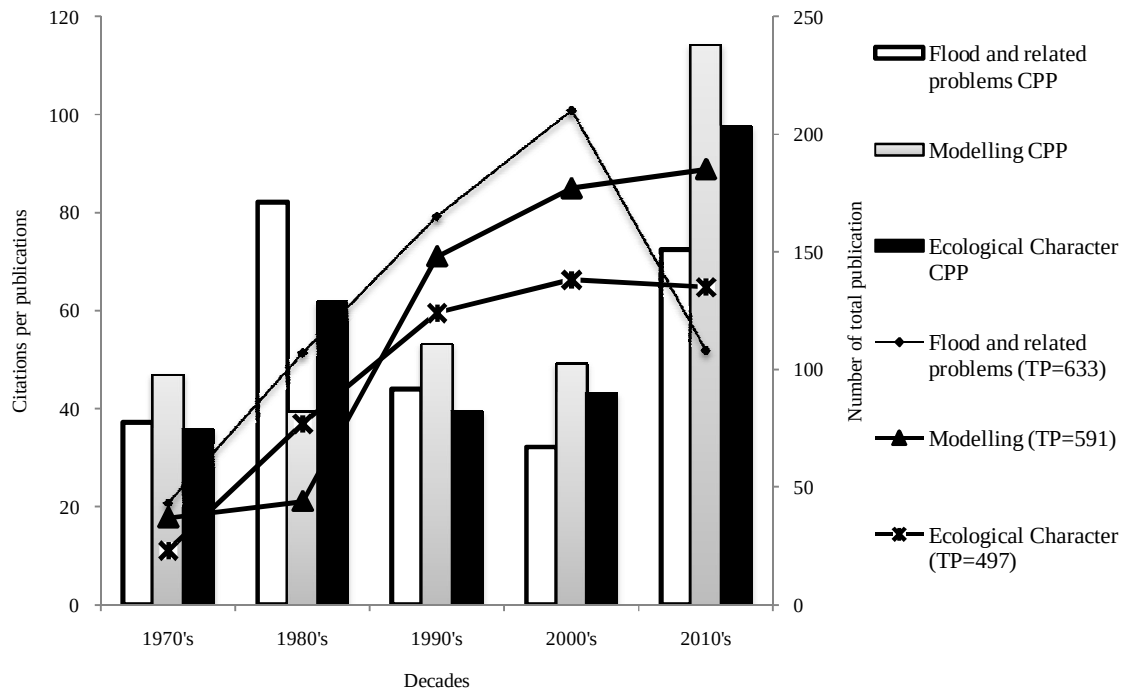


Fig 4. Decadal growth of floodplain discussion area

Performance of countries, continents and authors in floodplain research

Articles starting with England, Scotland, Northern Ireland and Wales were renamed as being from the UK. Articles from Hong Kong were excluded in the ones from China, but rather as a country. Among the 3222 articles from the data on Thomson Reuters' Web of Science, began from 45 countries. Among those articles, 2132 (66.2%) were independent publications, while 1090 (33.8%) were internationally collaborative publications. Beat 10 most gainful countries in floodplain research amid this period are recorded in Table 5, with information about total articles, independent articles, collaborative articles, first author articles, corresponding-author articles, and single-author articles delivered. Of course, a vast proportion of floodplain research amid 1970s-2010's period was

distributed by writers from USA (654; 20.3% of all articles), trailed by those from UK (572; 17.7%), Australia (437; 13.5%) and India (382; 11.8%). USA and UK were the main 2 countries by the total number of publications, single-country publications, internationally collaborative publications, first author publications, and single-author publications. Moreover, the positioning of the main 4 nations stayed altered for TPR, FPR, and RPR, SPR. USA took first position in TPR, FPR and SPR, where as UK got 1st in CPR and RPR. The decadal growth of research is also become higher in UK in recent days rather than USA (Fig.5). Additionally, in continents, wise case, expansive bit of research distributed by Europe, trailed by North America and Asia. Best 3 most beneficial continents in river morphology research amid this period are recorded in Table 6.

Table 5: Top countries of floodplain research with TP≥100

Country	TP	TPR (%)	CPR (%)	FPR (%)	RPR (%)	SPR (%)
USA	654	1 (20.3)	2 (17.6)	1 (21.1)	4 (17.4)	1 (18.7)
UK	572	2 (17.7)	1 (18.9)	2 (20.7)	1 (19.6)	2 (18.1)
Australia	437	3 (13.5)	5 (15.7)	3 (19.6)	7 (10.3)	3 (17.4)
India	382	4 (11.8)	3 (17.1)	4 (19.1)	2 (18.7)	5 (11.3)
China	319	5 (9.9)	4 (16.6)	8 (8.7)	3 (18.1)	4 (13.1)
Italy	284	6 (8.8)	8 (9.3)	6 (13.2)	6 (13.7)	8 (7.2)
Germany	206	7 (6.4)	7 (10.2)	5 (16.1)	5 (15.2)	6 (9.8)
Netherland	127	8 (3.9)	6 (12.9)	7 (10.3)	8 (8.9)	7 (8)

TP= Number of total articles; CP= Number of Internationally collaborative articles; FP= Number of First Author articles; SP= Number of single country article; RP= Number of corresponding author article; R= Rank

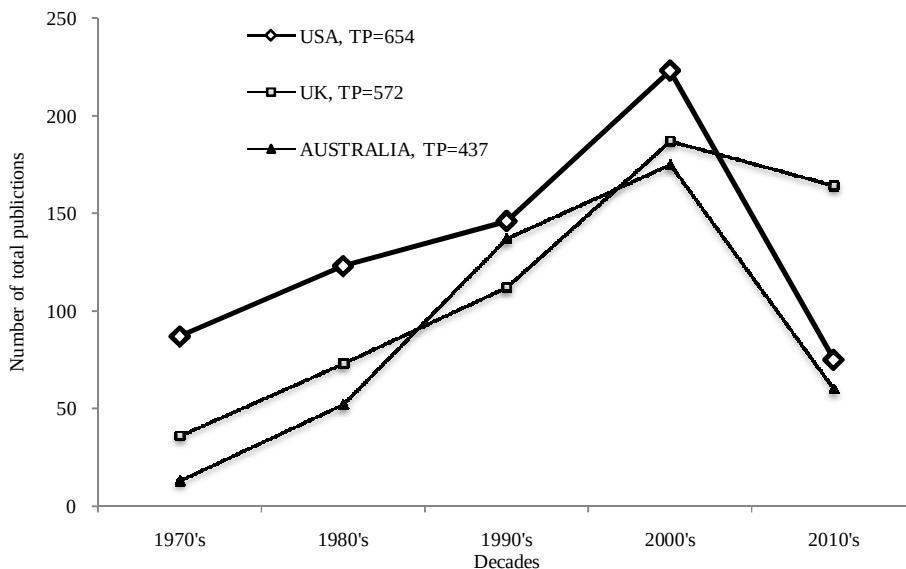


Fig 5. Decade wise growth of publication in Top 3 countries

Table 6. Top continents of floodplain research with TP $\geq$ 100

Continent	TP	TPR (%)	CPR (%)	FPR (%)	RPR (%)	SPR (%)
Europe	1343	1 (41.6)	1 (37.3)	2 (30.6)	3 (30.2)	2 (27.1)
North America	784	2 (24.3)	3 (28.8)	1 (33.1)	4 (27.4)	1 (30.2)
Asia	714	3 (22.2)	2 (32.1)	4 (26.2)	1 (34.5)	4 (22.3)

SP= Number of single continent article

Countries assume a vital part in contemporary science. To evaluate trade of scientific information between the countries, research collaboration among countries and continents were broke down. Taking all things together, 41 countries had coordinated efforts with each other in floodplain research. The most shared countries in this period, as far as accrued collaborative articles were UK (109 articles; 18.9% of 572 articles), USA (115; 17.6%) and India (66; 17.1%). The biggest extent of the collaborative research articles was co-authored with continents like Europe (501 articles; 37.3% of 1343 articles) and Asia (222; 32.1%).

Reader performance and logical effect of published work were contemplated by breaking down the most cited productions in floodplain research from 1970's-2010's. The rundown of the most cited articles (TC2015 $\geq$ 100) is given in Table 7. The whole list of top cited works comprised of research articles. The main subject areas secured by the most cited articles were: 'floodplain restoration' (4 articles) and 'flood related problem' (2 article), which were cited 563 times; trailed by 'modelling' (2 articles), cited 417 times. The top articles are sorted by the number of times they were cited until the end of 2015 in descending order and their citation counts in 2015 alone, in their publication year, and citations per year along with the respective ranks are also shown. The most cited article in floodplain research is *Bates and de Roo* with 200 citations received in total and which is most highly cited article continuously since 2000, followed by *Williams* with 153 citations since 1978. The seventh paper in the list was also the most frequently cited article in 2015 with 21 citations and the best articles in terms of citations per year (14.8). However, in the year of its publication, it was rarely cited (1). On the other, the first paper was cited very less (1) in 2015 and citations per year value (13.3) is third largest among the tally. In terms of citing articles, first three papers are much more higher than others too. Fig 6., shows the decade wise growth of citations of highly cited papers in which last two decades are more cited than previous three.

Table 7. Top cited articles with TC $\geq$ 100

Author's Name	Rank (TC ₂₀₁₅)	Rank (C ₂₀₁₅)	Rank (C ₀)	Rank (TCPY)	Citing Articles
Bates and De Roo, 2000 ⁴³	1 (200)	9 (9)	21 (0)	4 (13.3)	563
Williams, 1978 ⁴⁴	2 (153)	11 (9)	23 (0)	23 (4.13)	280
Horritt and Bates, 2002 ⁴⁵	3 (135)	3 (15)	29 (0)	8 (10.4)	417
Vorosmarty et.al., 1989 ⁴⁶	4 (129)	27 (2)	22 (0)	(4.96)	190
Allen, 1983 ⁴⁷	5 (123)	21 (4)	17 (1)	21 (5.6)	313
Prigent et.al., 2007 ⁴⁸	6 (119)	2 (17)	14 (1)	2 (14.5)	109
Tal and Paola, 2007 ⁴⁹	7 (116)	1 (21)	31 (0)	1 (14.8)	130
Slingerland, 2004 ⁵⁰	8 (106)	4 (15)	8 (2)	11 (9.6)	116
Makaske, 2001 ⁵¹	9 (100)	5 (13)	36 (0)	17 (7.1)	251

TC₂₀₁₅=Total citations counted since articles were published until the end of 2015; C₂₀₁₅= Number of citations in 2015; C₀=Number of citations in publication year and TCPY=TC₂₀₁₅ per year.

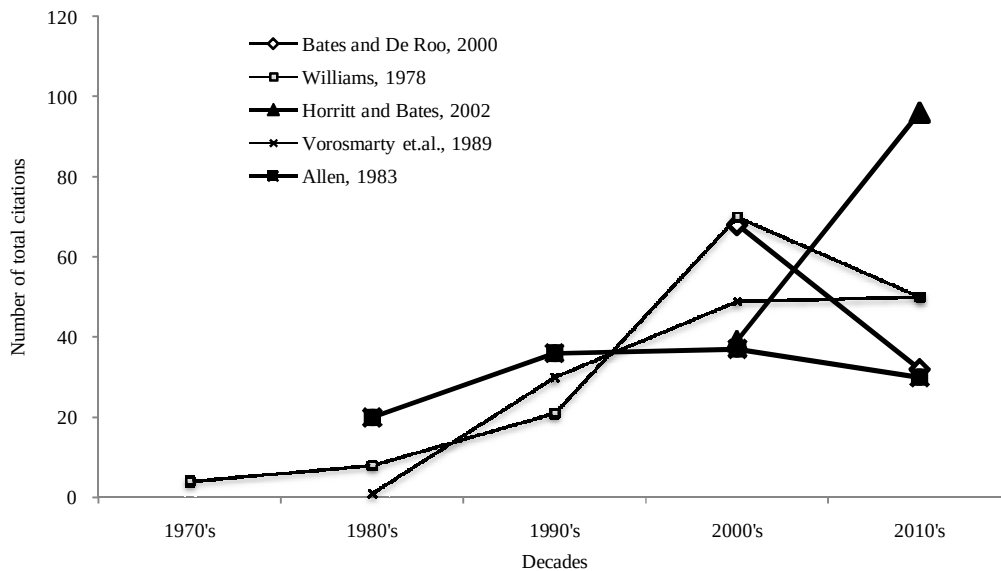


Fig 6. Decade wise growth of total citations in highly cited articles

Visibility of articles achieved its greatest inside 10-20 years of production and diminished from that point to close to zero in 30-40 years. However, the real length of ideal scientific visibility of articles fluctuated from country to country. Articles from USA had the most mean visibility ≥ 2.5 citations for every article. They were trailed by articles of UK (1.9 citations), India (1.4), and Australia (1.1 citations) origin. As can be seen from Fig. 7, internationally collaborative articles had the highest

visibility and scientific impact took after by single-country articles and single-author articles, respectively.

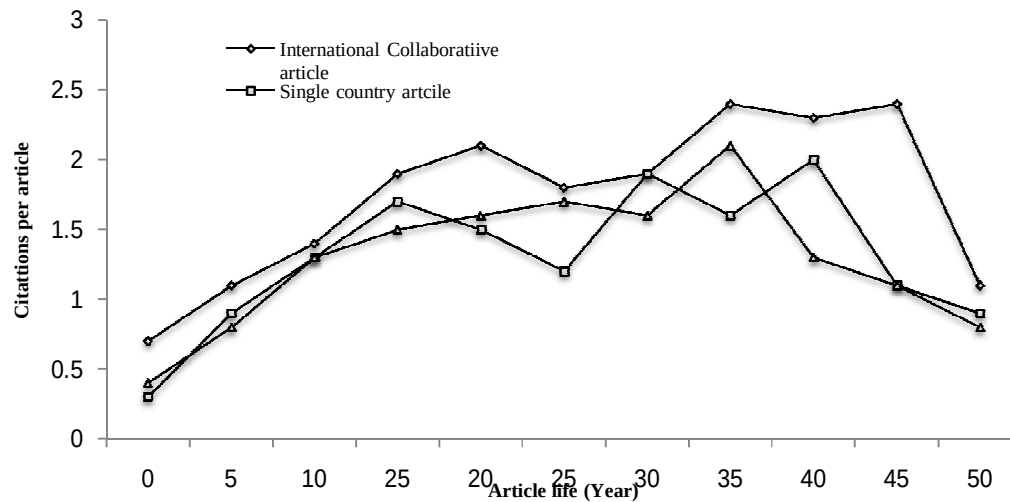


Fig 7. Impacts of collaboration effect of article visibility

CONCLUSION:

This bibliometric investigation of profoundly cited paper on floodplain research about has yielded some fascinating discoveries. Exceptionally cited papers won't have high references in early years and might be distributed in journals with low IF. A 50-year term might be a more proper time allotment for surveying the execution of a scientist and the utilization of IF as the reason for assessment may delude. Altogether, 3222 articles were distributed in SCI-EXPANDED from 1970 to 2015. Articles were distributed in 41 journals and were recorded in 14 Web of Science classifications in the science release in 2014. River research and Application and International Journal of River basin management were the most well-known journals in floodplain research. There was a sharp increment in articles decade savvy towards 2000's however after it diminishes gradually. Articles without the required pursuit words on their front page could be as yet found in SCI-EXPANDED which is intended for scientists to discover literature however not for bibliometric examine. The citation lives of the top articles in all out citations and in addition in production year and late year demonstrated that the effect of top articles in an exploration field may adjust as indicated by oddity and not just time. When all is said in done, the purported "classic" articles had low citations in their distribution year. The G7 were a piece of the main ten nations as far as production. It was noticed that the USA, as a nation, contributed the most autonomous and universally cooperative articles, and in addition first author articles. On account of mainlands, Europe contributed a lot of generation in single and universally shared articles reason for EU. Floods related issue and Modeling of floodplain

have been observed to be the most famous research center as of late in floodplain research. Higher citation of articles found in the floodplain modeling class which demonstrates the fast ubiquity and use of the model in a floodplain for eco-accommodating access of nature. As observed by the prominence of floodplain research in different nations and the affirmation of the capability of floodplain to help in the patient-particular territory in our constantly expanding elderly populace, the regenerative condition will keep on progressing with the coming of new research discoveries. The expansion of floodplain demonstrating additionally accommodating to shield humanity from flood and created as an eco-accommodating survivor.

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