change and forestry (LULUCF) activities, our farmers should seriously think of using this mechanism as a tool to gain financial benefits apart from the role in carbon offsetting. The opportunities in the ICM should be seriously tapped by such farmer groups whose lands are not giving sufficient dividends to them.

As a matter of fact, the agricultural sector in India has been badly hit for the past few decades, due to faulty Government policies, lack of implementation of Government schemes and continuous negligence of the agriculture sector resulting into farmer suicides. Moreover, the land acquisition bill recently pushed by the Central Government for acquiring farmers' lands for developmental purposes without their consent makes the situation even more grim for the farmer community across India.

There is ample scope for farmers to contribute to the A/R-CDM mechanism, generating carbon credits that can be sold in ICM, thus achieving environmental, economic, financial and social benefits. One of the most recent examples of financial benefits being flown to the participating farmer communities can be cited from Himachal Pradesh, India where reforestation under A/R-CDM was carried out in 3204 ha of degraded lands by the Himachal Pradesh State Forest Department. These lands were owned by farmer communities. After the acceptance of the verification report for the first cycle was completed in November 2014, the Government of Spain through the World Bank has agreed to release the first installment of INR 1.93 crores against a stored and verified 65,582 CERs. The financial incentives are expected to percolate down to farmers scattered in 10 districts, including 602 villages.

As the concept is not so popular among farmers, awareness should be spread at the grass-roots level about such practices by organizing awareness programmes in villages all across the country. The Government should also play a proactive role and provide technical inputs through its highly trained team of experts. Thus, it can be concluded that A/R-CDM projects could be a better alternative for Indian farmers facing a complexity of problems and successful implementation of more such projects in the second commitment period could find solutions to problems of the farmers.

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Citation peaks in modern science: 1900–2010

The references in an article indicate that the author believes they are of importance to the article, in that they support, illustrate, or elaborate on or are related to what the author has to say[1]. Citations have been considered as relating to authoritativeness[2], intellectual influence[3] and high quality[4], and it is hence normally assumed that greater the number of citations that a paper receives, greater is the impact (or influence, importance, authoritativeness, etc.) of that paper within its particular research community.

As the largest citation database, Thomson Reuters' *Web of Science* (*WoS*) provides data for citation analysis research. It contains citations of publications in over 10,000 of the world's most important academic journals dating back to 1900. Using the data of *WoS*-indexed journals, Thomson Reuters' *Essential Science Indicators* (*ESI*) reports the most cited papers in each field, including the rankings of highly cited papers (last ten years) and hot papers (last two years). However, these rankings are limited to a certain time period (recent ten or two years). Here, based on *WoS*, we have collected historical data to show the most highly cited papers in modern science. We first retrieve the top 100 highly cited papers in 1900–2010 by ranking the citations of all the *WoS* indexed papers in descending order. Then, we retrieve all the annual papers in the *WoS* by each year, and arrange them by citations in descending order. Last, we download these two sets of most highly cited papers (i.e. citation peak), which constitute the basic dataset in the present study. Because articles need time to be highly cited publications, we do not consider the recent ones.

By counting citations to all the *WoS*-indexed papers in 1900–2010, Figure 1 shows 100 stars indicating the top 100 highly cited papers in history. Clearly, papers published during and before 1950 rarely take up 6% of the top 100; those during and after 2001 account for only 2%, and the remaining 92% was published during the period 1951–2000. The histogram in Figure 1 reveals that 24 out of the top 100 papers were published during the decade 1981–1990, significantly higher than the numbers in other decades. The most productive three countries/territories are USA (43), Germany (7) and England (5), together contributing 55% of the highly cited papers to the total. According to the 22 broad categories listed in the *WoS*, the three most active fields are biochemistry and molecular biology (39), physics (11) and chemistry (10). The distribution of the highly cited papers among journals is not as concentrated as countries/territories or research fields, since the most dedicated three journals contribute 23% to the top 100 papers; they are *Journal of Biological Chemistry* (10), *Nucleic Acids Research* (7) and *Analytical Biochemistry* (6).

It is generally believed that review articles are cited more frequently than typical research articles because they often serve as surrogates for earlier literature, especially in journals that discourage extensive bibliographies. Unexpectedly here, 91 of the top 100 papers are research articles, with only 5 notes and 4 reviews, including a software review.

Total citations of publications tend to grow over time. In theory, it weighs heavily against newly published papers to compare them with highly cited papers. It is clear from Figure 2 *a* that citations of the most highly cited papers

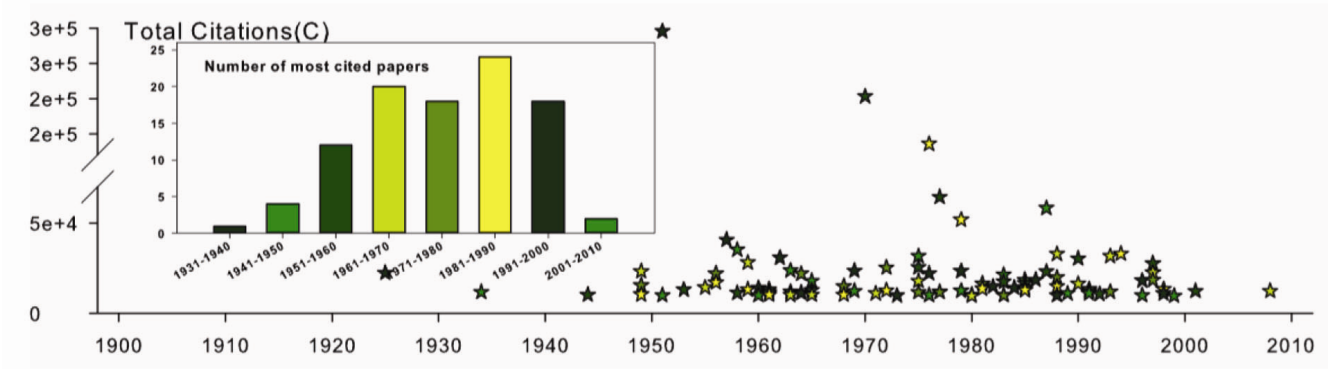

Figure 1. Top 100 highly cited papers in 1900–2010. (Note: The top 10 papers are listed in Appendix 1).

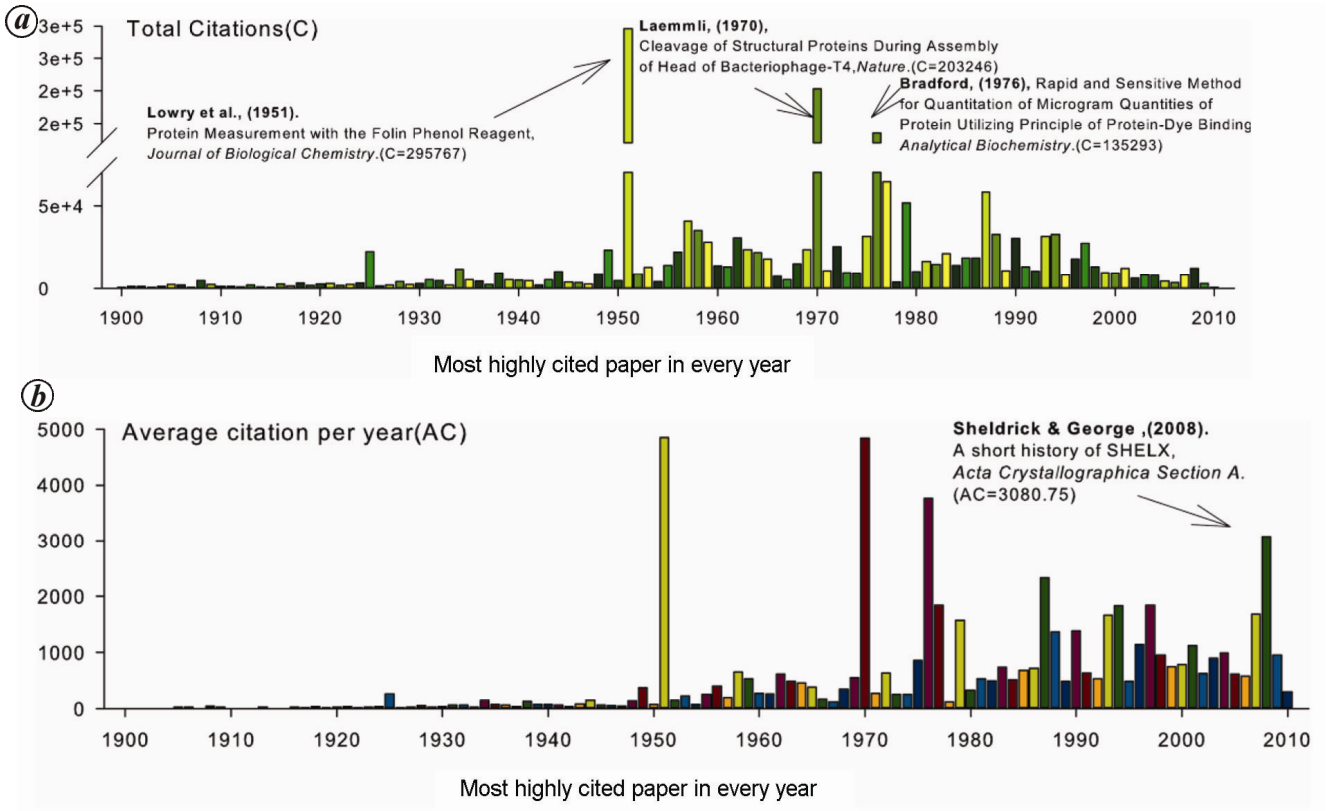

Figure 2. The most highly cited papers of each year in 1900–2010.

during 2001–2010 appear notably less than the period 1951–2000. Nevertheless, papers published in the second half of the 20th century receive significantly more citations than those in the first half. This may be attributed to the expansion of the *WoS* coverage over time, as well as the increase in citation density[5].

Average citations per year weigh against aging publications, contrary to total citations. Figure 2 *b* shows that the discrepancy widens between papers published in 2001–2010 and those in the first half the 20th century, compared with the case in Figure 2 *a*. A paper published in 1925 in Figure 2, for example, has 22,309 citations in total, which ranks it no. 21 among the 111 papers in Figure 2 *a*, but the average of 256.43 ranks it no. 52 in Figure 2 *b*, as its citations peaked in 1979 and declined afterwards. The total citations of another paper published in 2008 in Figure 2 is 12,323, ranking it no. 40, however, its average citations per year is 3080.75, ranking it in the fourth place.

Generally, citations of papers peak in the second, third, or fourth year after publication[6]. However, highly cited papers continue to be cited for many years. The peaks of the citations for the 100 papers in Figure 1 appear to be 21.9 years on average after their publication, ranging from zero to 56 years. $\text{Paper}_{(2008)}$ in Figure 2 reached its citation peak in the year it was published, and citations of $\text{paper}_{(1953)}$ did not peak until 2009. The range of the citation peaks of the 111 papers in Figure 2 is from zero to 109

Appendix 1. Top 10 citation peaks in modern science (1900–2010)

Title	Authors	Year	Journal	Citations
Protein measurement with the folin phenol reagent	Lowry, O. H., Rosebrough, N. J., Farr, A. L. and Randall, R. J.	1951	*Journal of Biological Chemistry*	295,767
Cleavage of structural proteins during assembly of head of bacteriophage-T4	Laemmli, U. K.	1970	*Nature*	203,246
Rapid and sensitive method for quantitation of microgram quantities of protein utilizing principle of protein-dye binding	Bradford, M. M.	1976	*Analytical Biochemistry*	135,293
DNA sequencing with chain-terminating inhibitors	Sanger, F., Nicklen, S. and Coulson, A. R.	1977	*Proceedings of National Academy of Sciences*	64,358
Single-step method of RNA isolation by acid guanidinium thiocyanate phenol chloroform extraction	Chomczynski, P. and Sacchi, N.	1987	*Analytical Biochemistry*	58,282
Electrophoretic transfer of proteins from polyacrylamide gels to nitrocellulose sheets – procedure and some applications	Towbin, H., Staehelin, T. and Gordon, J.	1979	*Proceedings of National Academy of Sciences*	51,784
A simple method for the isolation and purification of total lipids from animal tissues	Folch, J., Lees, M. and Stanley, G. H. S.	1957	*Journal of Biological Chemistry*	40,751
Nonparametric-estimation from incomplete observations	Kaplan, E. L. and Meier, P.	1958	*Journal of the American Statistical Association*	35,230
Clustal-W – improving the sensitivity of progressive multiple sequence alignment through sequence weighting, position-specific gap penalties and weight matrix choice	Thompson, J. D., Higgins, D. G. and Gibson, T. J.	1994	*Nucleic Acids Research*	32,942
Development of the Colle–Salvetti correlation-energy formula into a functional of the electron-density	Lee, C. T., Yang, W. T and Parr, R. G.	1988	*Physical Review B*	32,849

years, the average of which is 42.2. Also, 53.2% of the 111 papers received the highest annual citations no. earlier than 2005, but if the publication year of the 111 papers is limited to 1900–1920, the percentage rises to 76.2. The citation count of paper$_{(1901)}$ is increasing since its publication; it reached 229 in 2014.

To conclude, in the past 100 years, most of the citation peaks appear in the last half a century. Many citation peaks have a long time vitality. They are and will continue to be the treasures and milestones in the history of modern science.

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3. Zuckerman, H., *Scientometrics*, 1987, **12**, 329–338.
4. Lehmann, S., Jackson, A. D. and Lautrup, B. E., *Nature*, 2006, **444**, 1003–1004.
5. Ioannidis, J. P. A., *PLoS ONE*, 2006, **1**, e5.
6. http://sciencewatch.com/

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