南京大學

NANJING UNIVERSITY

生命周期评价研究进展及其在环境管理中的应用

袁增伟

2016年5月10日

内容提纲

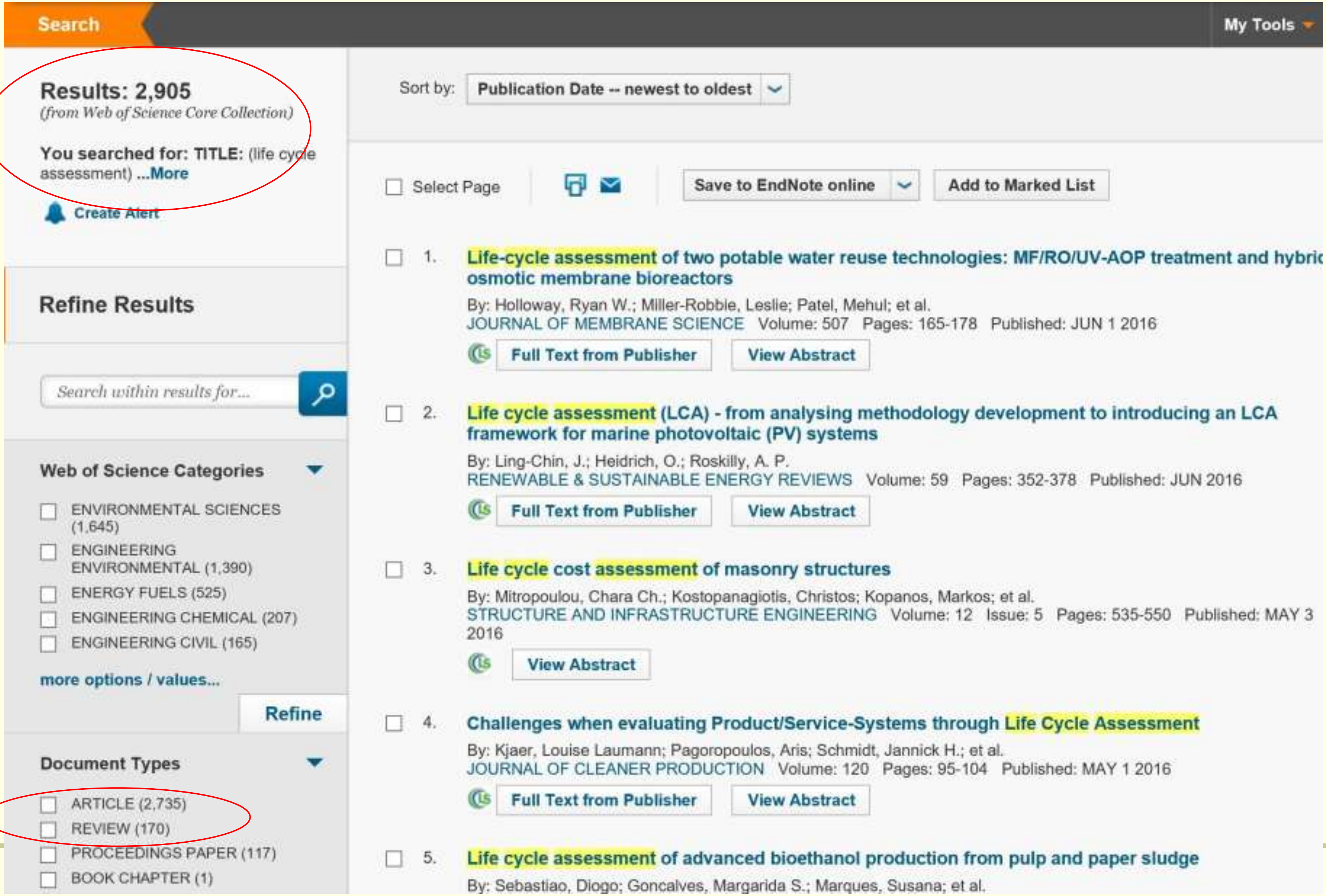
- Life cycle thinking vs. Life cycle assessment
- SCI-EXTENDED文献分析
- 基于高引用文献的前沿热点分析
- LCA在环境管理中的应用
- 课题组在LCA方面的一些工作

一、Life cycle thinking vs. Life cycle assessment

- LCT旨在从产品/技术/工艺等生命周期视角去分析、评估特定系统的某一特征，规避局部有效/最优，总体无效
  - 成本有效性
  - 成本效益
  - 环境影响
  - 资源效率
  - ……

- LCA通过建立特定产品系统生命周期过程的输入、输出物料清单，定量测算产品生命周期的潜在环境影响，识别环境“热点”并提出解决方案。
  - 应用范畴正在从微观的产品/技术系统拓展到宏观的经济社会系统，并与区域层面的物质流分析相融合，实现对区域系统或特定人类活动的潜在环境影响的定量评估。

二、生命周期国际文献分析



Results: 2,905
(from Web of Science Core Collection)

You searched for: TITLE: (life cycle assessment) ...More

Sort by: Publication Date -- newest to oldest

Refine Results

Web of Science Categories

☐ ENVIRONMENTAL SCIENCES (1,645)
☐ ENGINEERING ENVIRONMENTAL (1,390)
☐ ENERGY FUELS (525)
☐ ENGINEERING CHEMICAL (207)
☐ ENGINEERING CIVIL (165)

Document Types

☐ ARTICLE (2,735)
☐ REVIEW (170)
☐ PROCEEDINGS PAPER (117)
☐ BOOK CHAPTER (1)

☐ 1. Life-cycle assessment of two potable water reuse technologies: MF/RO/UV-AOP treatment and hybri osmotic membrane bioreactors
By: Holloway, Ryan W.; Miller-Robbie, Leslie; Patel, Mehul; et al.
JOURNAL OF MEMBRANE SCIENCE Volume: 507 Pages: 165-178 Published: JUN 1 2016

☐ 2. Life cycle assessment (LCA) - from analysing methodology development to introducing an LCA framework for marine photovoltaic (PV) systems
By: Ling-Chin, J.; Heidrich, O.; Roskilly, A. P.
RENEWABLE & SUSTAINABLE ENERGY REVIEWS Volume: 59 Pages: 352-378 Published: JUN 2016

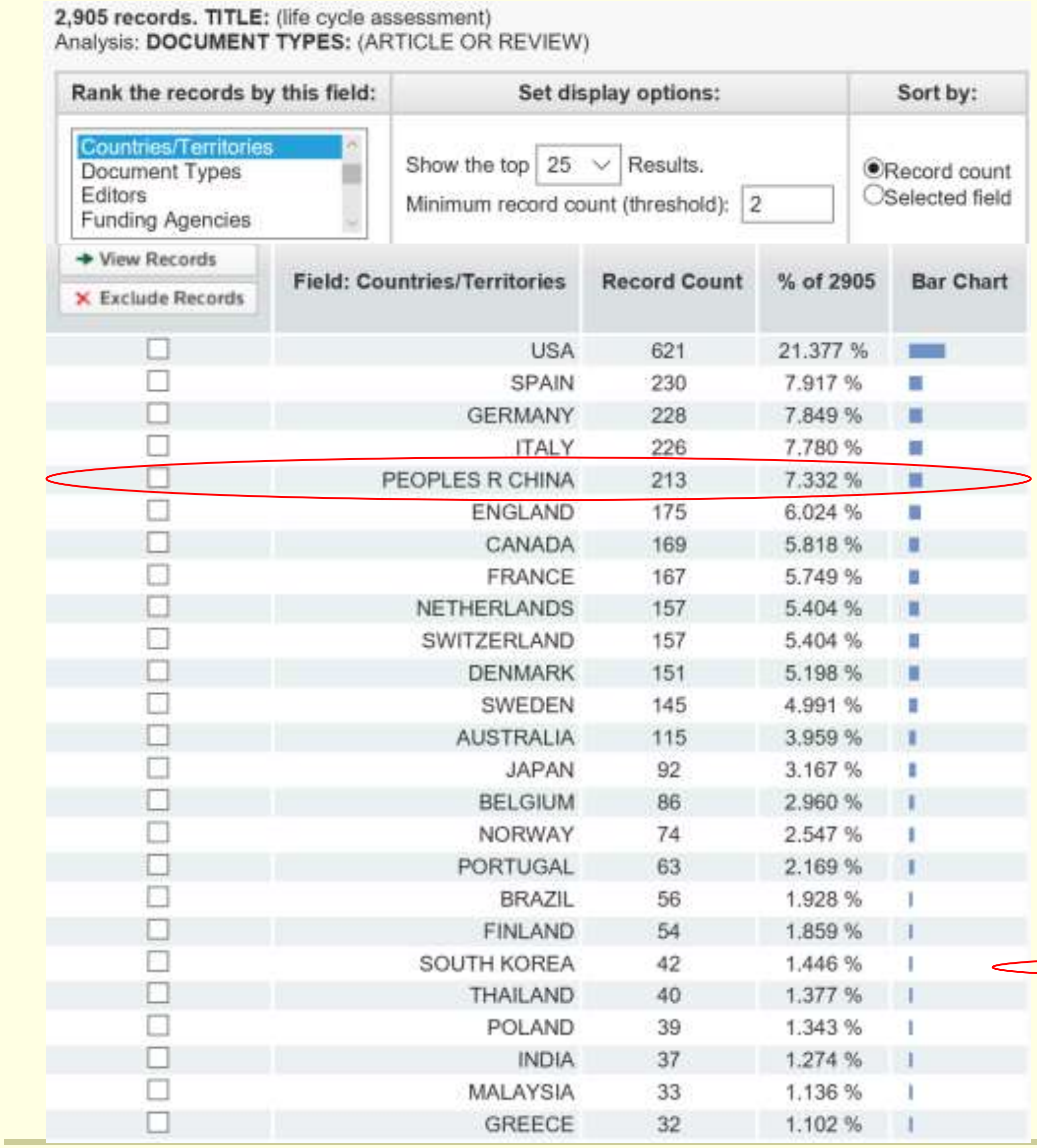
☐ 3. Life cycle cost assessment of masonry structures
By: Mitropoulou, Chara Ch.; Kostopanagiotis, Christos; Kopanos, Markos; et al.
STRUCTURE AND INFRASTRUCTURE ENGINEERING Volume: 12 Issue: 5 Pages: 535-550 Published: MAY 3 2016

☐ 4. Challenges when evaluating Product/Service-Systems through Life Cycle Assessment
By: Kjaer, Louise Laumann; Pagoropoulos, Aris; Schmidt, Jannick H.; et al.
JOURNAL OF CLEANER PRODUCTION Volume: 120 Pages: 95-104 Published: MAY 1 2016

☐ 5. Life cycle assessment of advanced bioethanol production from pulp and paper sludge
By: Sebastiao, Diogo; Goncalves, Margarida S.; Marques, Susana; et al.

- 在Web of Science核心数据库SCI-EXTENDED中以Life cycle assessment为标题（title）检索出来1900-2016年间数据
- 仅选择article和review两类

二、生命周期国际文献分析



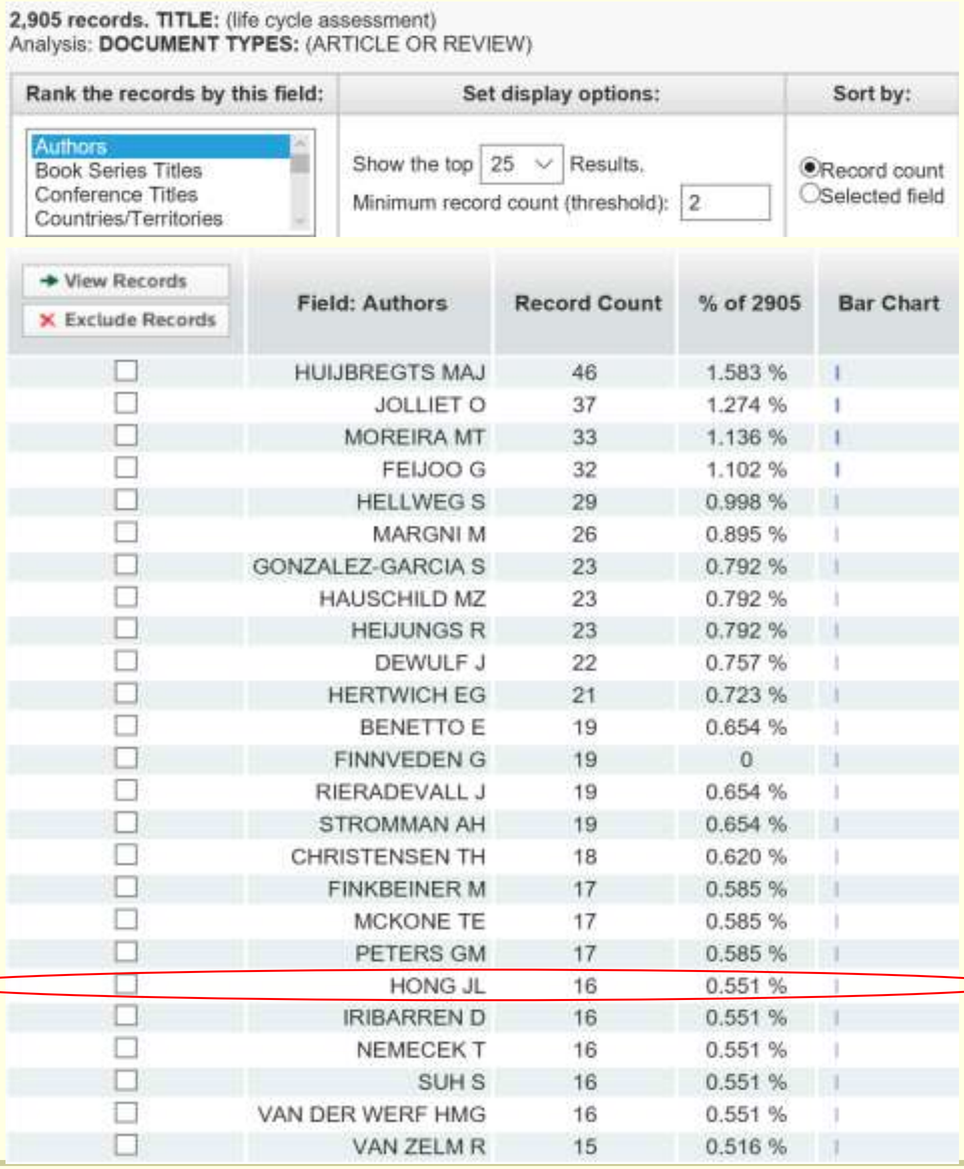
2,905 records. TITLE: (life cycle assessment)
Analysis: **DOCUMENT TYPES:** (ARTICLE OR REVIEW)

Rank the records by this field: Countries/Territories (Document Types, Editors, Funding Agencies)

Set display options: Show the top 25 Results. Minimum record count (threshold): 2

Sort by: ● Record count ○ Selected field

	Field: Countries/Territories	Record Count	% of 2905	Bar Chart
☐	USA	621	21.377 %	
☐	SPAIN	230	7.917 %	
☐	GERMANY	228	7.849 %	
☐	ITALY	226	7.780 %	
☐	PEOPLES R CHINA	213	7.332 %	
☐	ENGLAND	175	6.024 %	
☐	CANADA	169	5.818 %	
☐	FRANCE	167	5.749 %	
☐	NETHERLANDS	157	5.404 %	
☐	SWITZERLAND	157	5.404 %	
☐	DENMARK	151	5.198 %	
☐	SWEDEN	145	4.991 %	
☐	AUSTRALIA	115	3.959 %	
☐	JAPAN	92	3.167 %	
☐	BELGIUM	86	2.960 %	
☐	NORWAY	74	2.547 %	
☐	PORTUGAL	63	2.169 %	
☐	BRAZIL	56	1.928 %	
☐	FINLAND	54	1.859 %	
☐	SOUTH KOREA	42	1.446 %	
☐	THAILAND	40	1.377 %	
☐	POLAND	39	1.343 %	
☐	INDIA	37	1.274 %	
☐	MALAYSIA	33	1.136 %	
☐	GREECE	32	1.102 %	



2,905 records. TITLE: (life cycle assessment)
Analysis: **DOCUMENT TYPES:** (ARTICLE OR REVIEW)

Rank the records by this field: Authors (Book Series Titles, Conference Titles, Countries/Territories)

Set display options: Show the top 25 Results. Minimum record count (threshold): 2

Sort by: ● Record count ○ Selected field

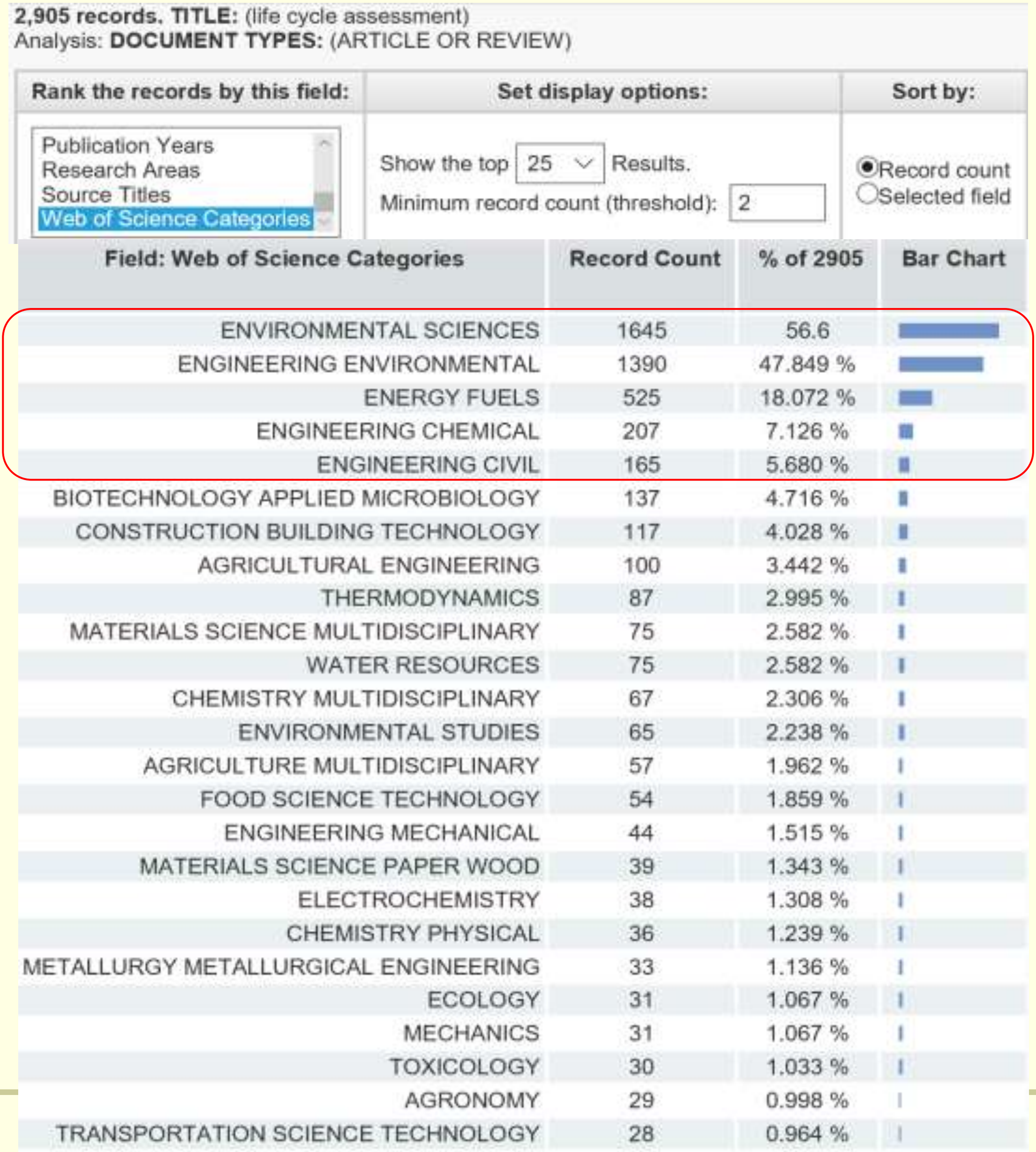
	Field: Authors	Record Count	% of 2905	Bar Chart
☐	HUIJBREGTS MAJ	46	1.583 %	
☐	JOLLIET O	37	1.274 %	
☐	MOREIRA MT	33	1.136 %	
☐	FEIJOO G	32	1.102 %	
☐	HELLWEG S	29	0.998 %	
☐	MARGNI M	26	0.895 %	
☐	GONZALEZ-GARCIA S	23	0.792 %	
☐	HAUSCHILD MZ	23	0.792 %	
☐	HEIJUNGS R	23	0.792 %	
☐	DEWULF J	22	0.757 %	
☐	HERTWICH EG	21	0.723 %	
☐	BENETTO E	19	0.654 %	
☐	FINNVEDEN G	19	0	
☐	RIERADEVALL J	19	0.654 %	
☐	STROMMAN AH	19	0.654 %	
☐	CHRISTENSEN TH	18	0.620 %	
☐	FINKBEINER M	17	0.585 %	
☐	MCKONE TE	17	0.585 %	
☐	PETERS GM	17	0.585 %	
☐	HONG JL	16	0.551 %	
☐	IRIBARREN D	16	0.551 %	
☐	NEMECEK T	16	0.551 %	
☐	SUH S	16	0.551 %	
☐	VAN DER WERF HMG	16	0.551 %	
☐	VAN ZELM R	15	0.516 %	

从SCI收录论文总量来看，全球排名第五，但起步比较晚，成果分散，没有形成集聚，领域国际知名学者和有影响力的学者人数偏少

二、生命周期国际文献分析

No Chinese

Field: Organizations-Enhanced	Record Count	% of 2905	Bar Chart
TECHNICAL UNIVERSITY OF DENMARK	104	3.580 %	▮
UNIVERSITY OF CALIFORNIA SYSTEM	92	3.167 %	▮
SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZURICH	63	2.169 %	▮
NORWEGIAN UNIVERSITY OF SCIENCE TECHNOLOGY	61	2.100 %	▮
INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE INRA	57	1.962 %	▮
RADBOUD UNIVERSITY NIJMEGEN	53	1.824 %	▮
UNITED STATES DEPARTMENT OF ENERGY DOE	52	1.790 %	▮
CHALMERS UNIVERSITY OF TECHNOLOGY	47	1.618 %	▮
UNIVERSITY OF MICHIGAN SYSTEM	45	1.549 %	▮
UNIVERSITY OF CALIFORNIA BERKELEY	44	1.515 %	▮
UNIVERSITY OF MICHIGAN	44	1.515 %	▮
UNIVERSITY OF MONTREAL	43	1.480 %	▮
UNIVERSITY OF SANTIAGO DE COMPOSTELA	41	1.411 %	▮
AUTONOMOUS UNIVERSITY OF BARCELONA	38	1.308 %	▮
EUROPEAN COMMISSION JOINT RESEARCH CENTRE	36	1.239 %	▮
LEIDEN UNIVERSITY	35	1.205 %	▮
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	35	1.205 %	▮
POLYTECHNIQUE MONTREAL	34	1.170 %	▮
EC JRC ISPRA SITE	33	1.136 %	▮
ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	33	1.136 %	▮
GHENT UNIVERSITY	33	1.136 %	▮
ROYAL INSTITUTE OF TECHNOLOGY	32	1.102 %	▮
UNIVERSITAT ROVIRA I VIRGILI	32	1.102 %	▮
FLORIDA STATE UNIVERSITY SYSTEM	31	1.067 %	▮
PENNSYLVANIA COMMONWEALTH SYSTEM OF HIGHER EDUCATION PCSHE	29	0.998 %	▮



2,905 records. TITLE: (life cycle assessment)
Analysis: **DOCUMENT TYPES:** (ARTICLE OR REVIEW)

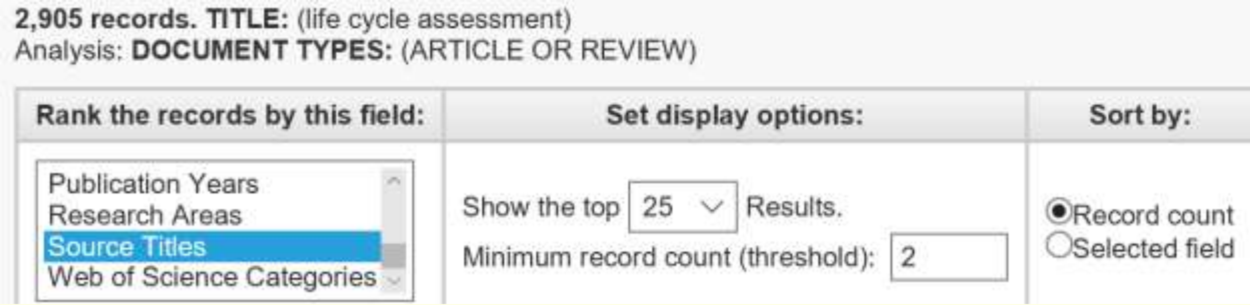
Rank the records by this field:
Publication Years
Research Areas
Source Titles
Web of Science Categories

Set display options:
Show the top 25 Results.
Minimum record count (threshold): 2

Sort by:
● Record count
○ Selected field

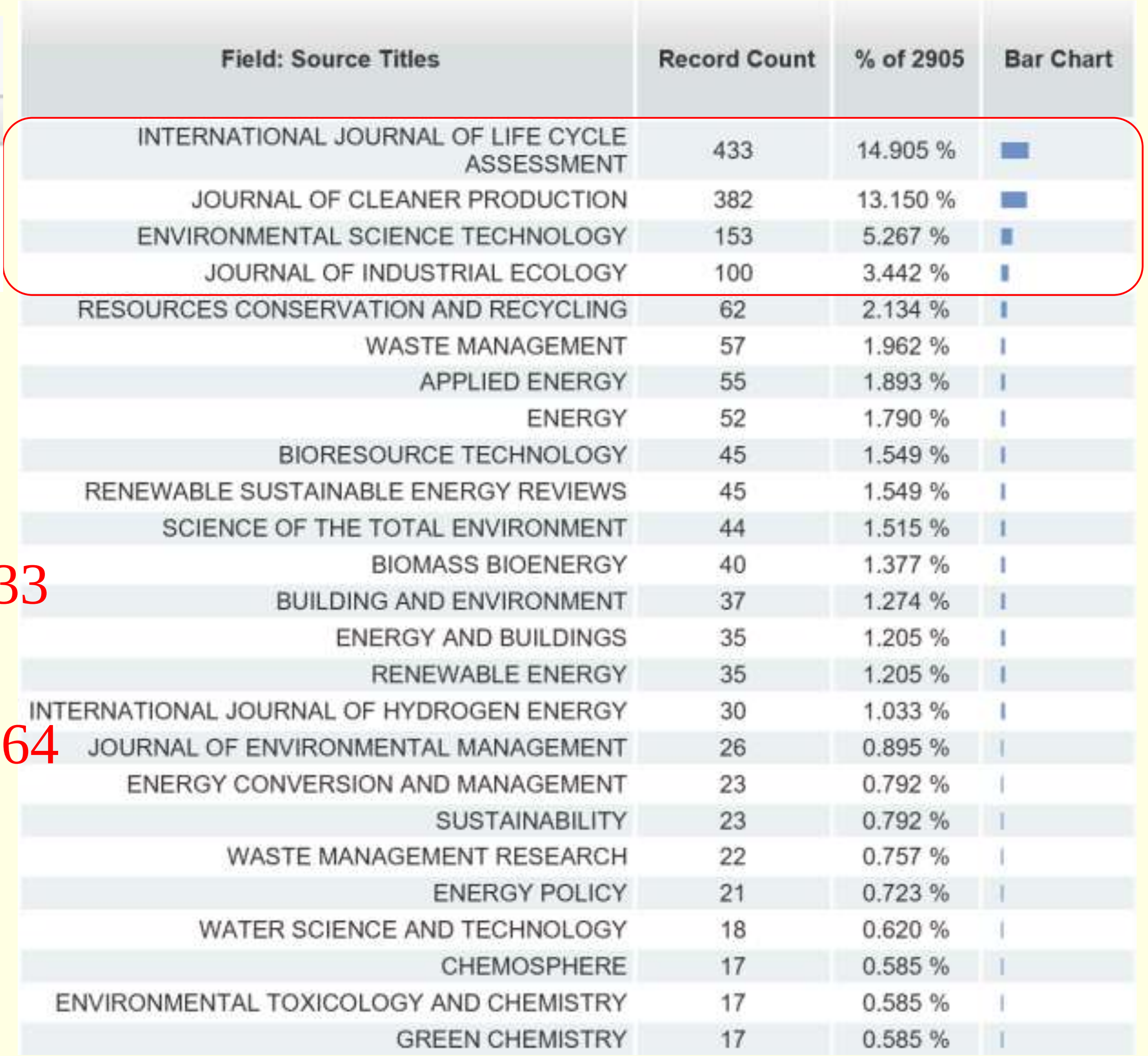
Field: Web of Science Categories	Record Count	% of 2905	Bar Chart
ENVIRONMENTAL SCIENCES	1645	56.6	▮
ENGINEERING ENVIRONMENTAL	1390	47.849 %	▮
ENERGY FUELS	525	18.072 %	▮
ENGINEERING CHEMICAL	207	7.126 %	▮
ENGINEERING CIVIL	165	5.680 %	▮
BIOTECHNOLOGY APPLIED MICROBIOLOGY	137	4.716 %	▮
CONSTRUCTION BUILDING TECHNOLOGY	117	4.028 %	▮
AGRICULTURAL ENGINEERING	100	3.442 %	▮
THERMODYNAMICS	87	2.995 %	▮
MATERIALS SCIENCE MULTIDISCIPLINARY	75	2.582 %	▮
WATER RESOURCES	75	2.582 %	▮
CHEMISTRY MULTIDISCIPLINARY	67	2.306 %	▮
ENVIRONMENTAL STUDIES	65	2.238 %	▮
AGRICULTURE MULTIDISCIPLINARY	57	1.962 %	▮
FOOD SCIENCE TECHNOLOGY	54	1.859 %	▮
ENGINEERING MECHANICAL	44	1.515 %	▮
MATERIALS SCIENCE PAPER WOOD	39	1.343 %	▮
ELECTROCHEMISTRY	38	1.308 %	▮
CHEMISTRY PHYSICAL	36	1.239 %	▮
METALLURGY METALLURGICAL ENGINEERING	33	1.136 %	▮
ECOLOGY	31	1.067 %	▮
MECHANICS	31	1.067 %	▮
TOXICOLOGY	30	1.033 %	▮
AGRONOMY	29	0.998 %	▮
TRANSPORTATION SCIENCE TECHNOLOGY	28	0.964 %	▮

二、生命周期国际文献分析



2,905 records. TITLE: (life cycle assessment)
Analysis: **DOCUMENT TYPES:** (ARTICLE OR REVIEW)

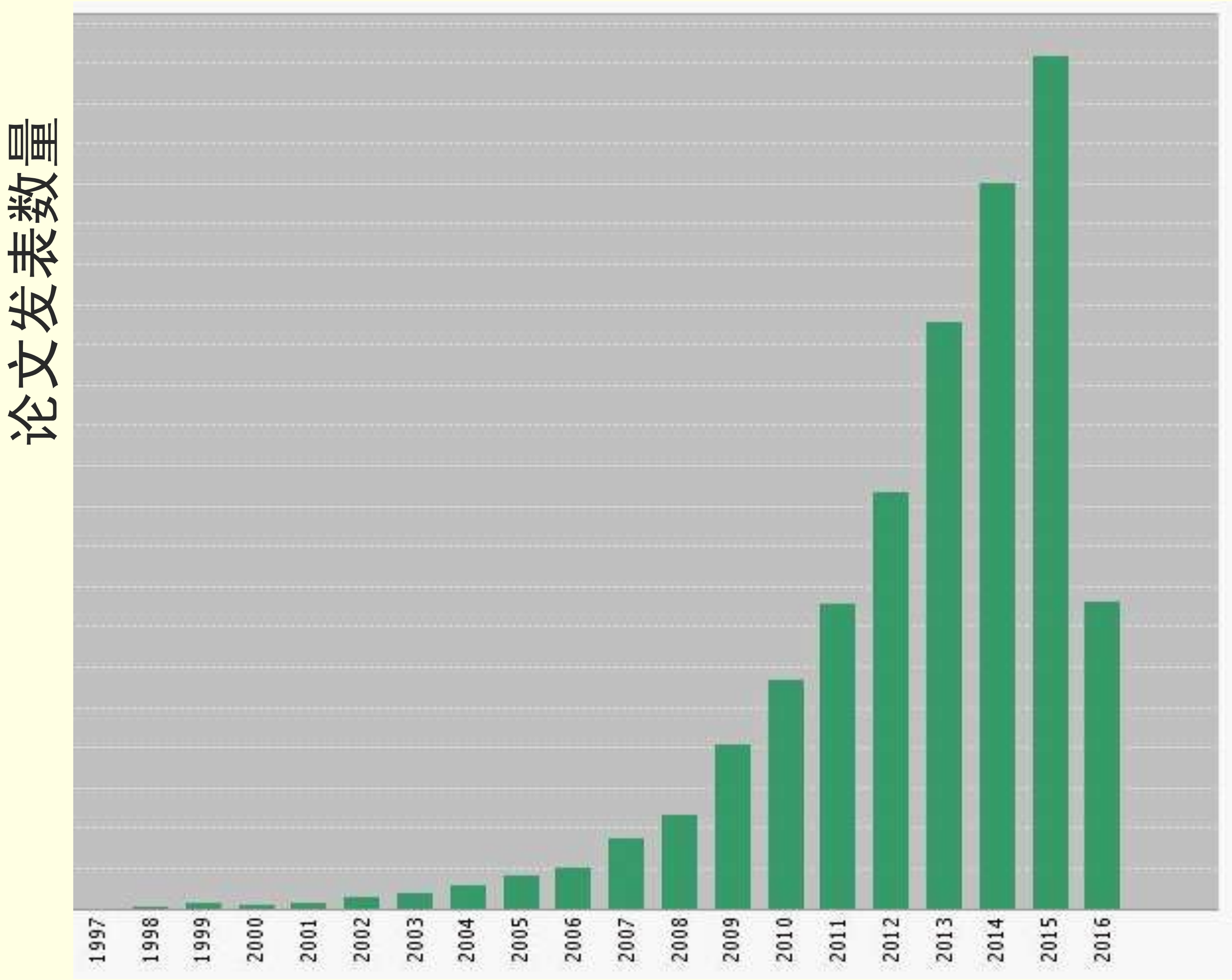
Rank the records by this field:	Set display options:	Sort by:
Publication Years Research Areas Source Titles Web of Science Categories	Show the top 25 Results. Minimum record count (threshold): 2	● Record count ○ Selected field



Field: Source Titles	Record Count	% of 2905	Bar Chart
INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT	433	14.905 %	
JOURNAL OF CLEANER PRODUCTION	382	13.150 %	
ENVIRONMENTAL SCIENCE TECHNOLOGY	153	5.267 %	
JOURNAL OF INDUSTRIAL ECOLOGY	100	3.442 %	
RESOURCES CONSERVATION AND RECYCLING	62	2.134 %	
WASTE MANAGEMENT	57	1.962 %	
APPLIED ENERGY	55	1.893 %	
ENERGY	52	1.790 %	
BIORESOURCE TECHNOLOGY	45	1.549 %	
RENEWABLE SUSTAINABLE ENERGY REVIEWS	45	1.549 %	
SCIENCE OF THE TOTAL ENVIRONMENT	44	1.515 %	
BIOMASS BIOENERGY	40	1.377 %	
BUILDING AND ENVIRONMENT	37	1.274 %	
ENERGY AND BUILDINGS	35	1.205 %	
RENEWABLE ENERGY	35	1.205 %	
INTERNATIONAL JOURNAL OF HYDROGEN ENERGY	30	1.033 %	
JOURNAL OF ENVIRONMENTAL MANAGEMENT	26	0.895 %	
ENERGY CONVERSION AND MANAGEMENT	23	0.792 %	
SUSTAINABILITY	23	0.792 %	
WASTE MANAGEMENT RESEARCH	22	0.757 %	
ENERGY POLICY	21	0.723 %	
WATER SCIENCE AND TECHNOLOGY	18	0.620 %	
CHEMOSPHERE	17	0.585 %	
ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY	17	0.585 %	
GREEN CHEMISTRY	17	0.585 %	

- International Journal of Life Cycle Assessment, 3.988
- Journal of Cleaner Production, 3.844
- Environmental Science and Technology, 5.33
- Journal of Industrial Ecology, 3.227
- Resources Conservation and Recycling, 2.564
- Waste Management, 3.22
- Applied Energy, 5.613
- Energy, 4.844

二、生命周期国际文献分析



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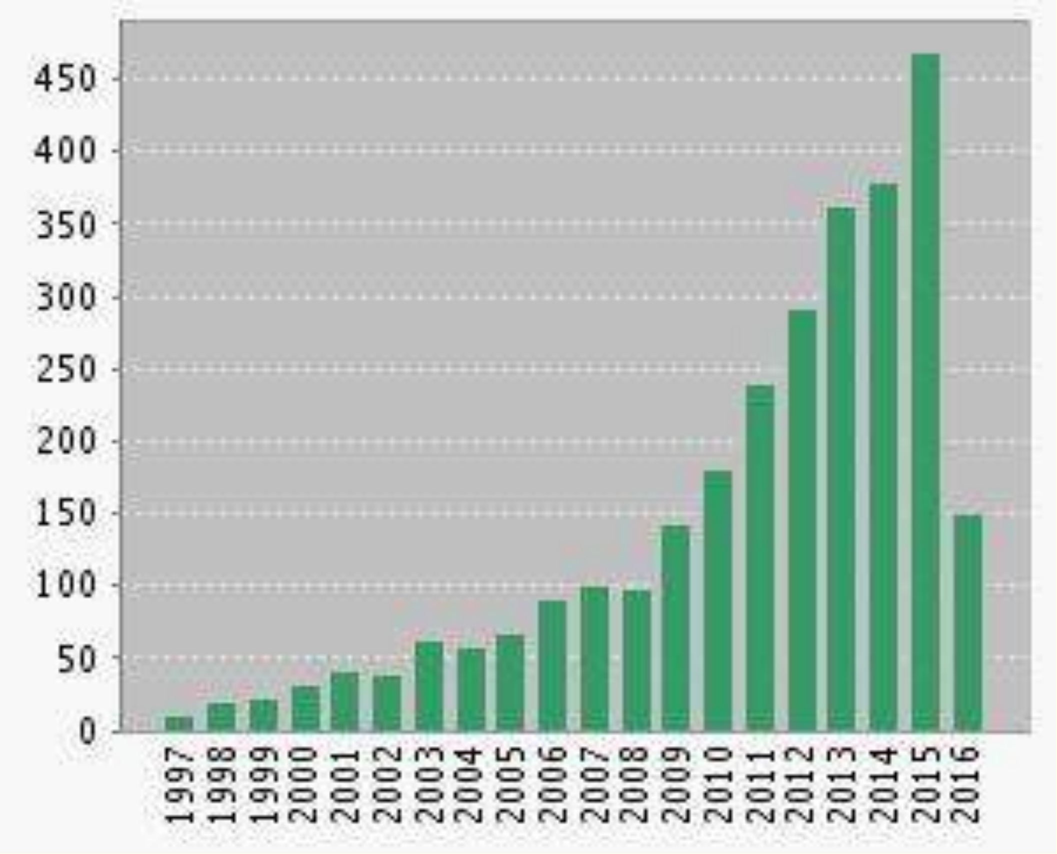
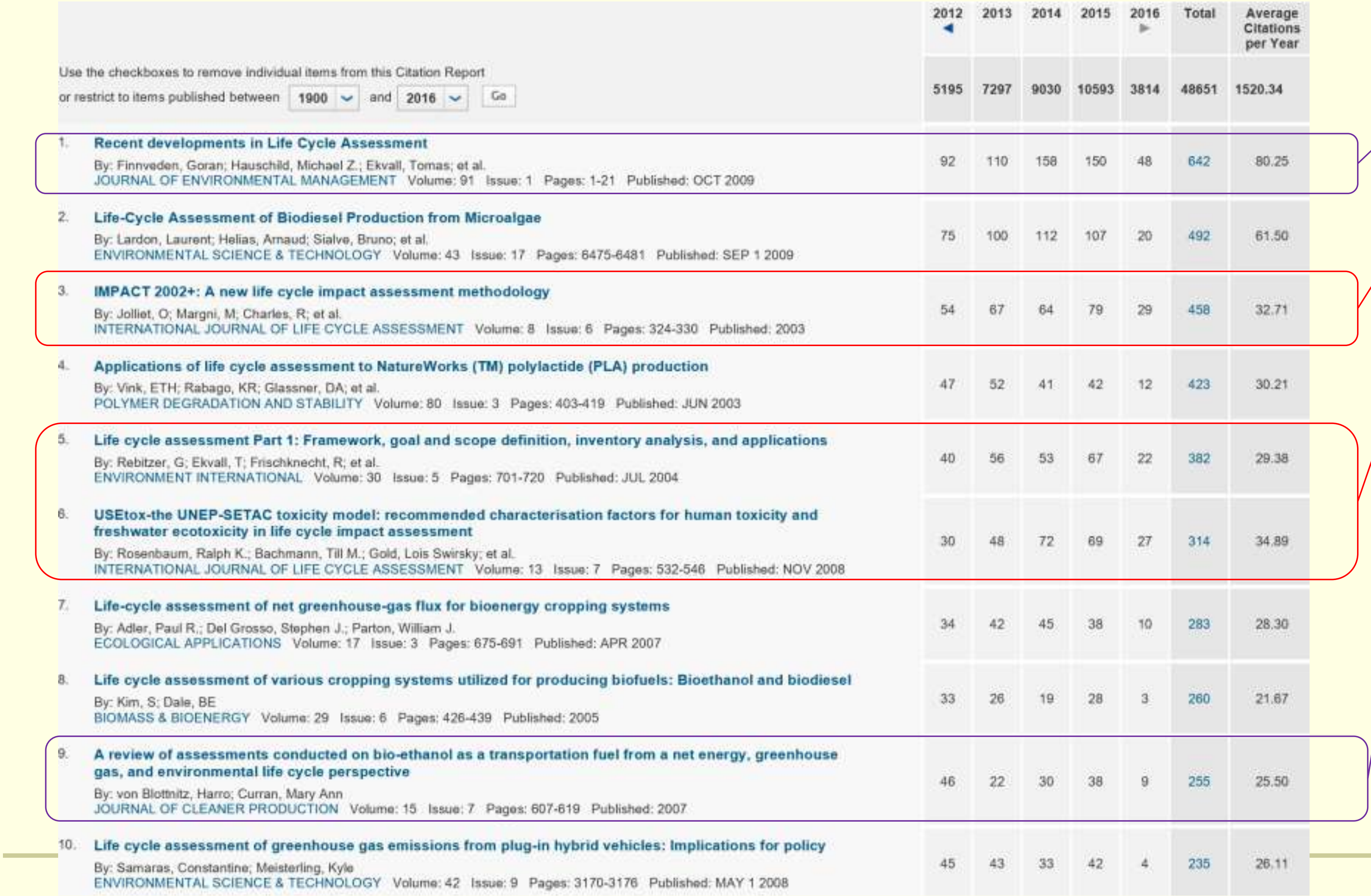


三、基于高引用文献的前沿热点分析



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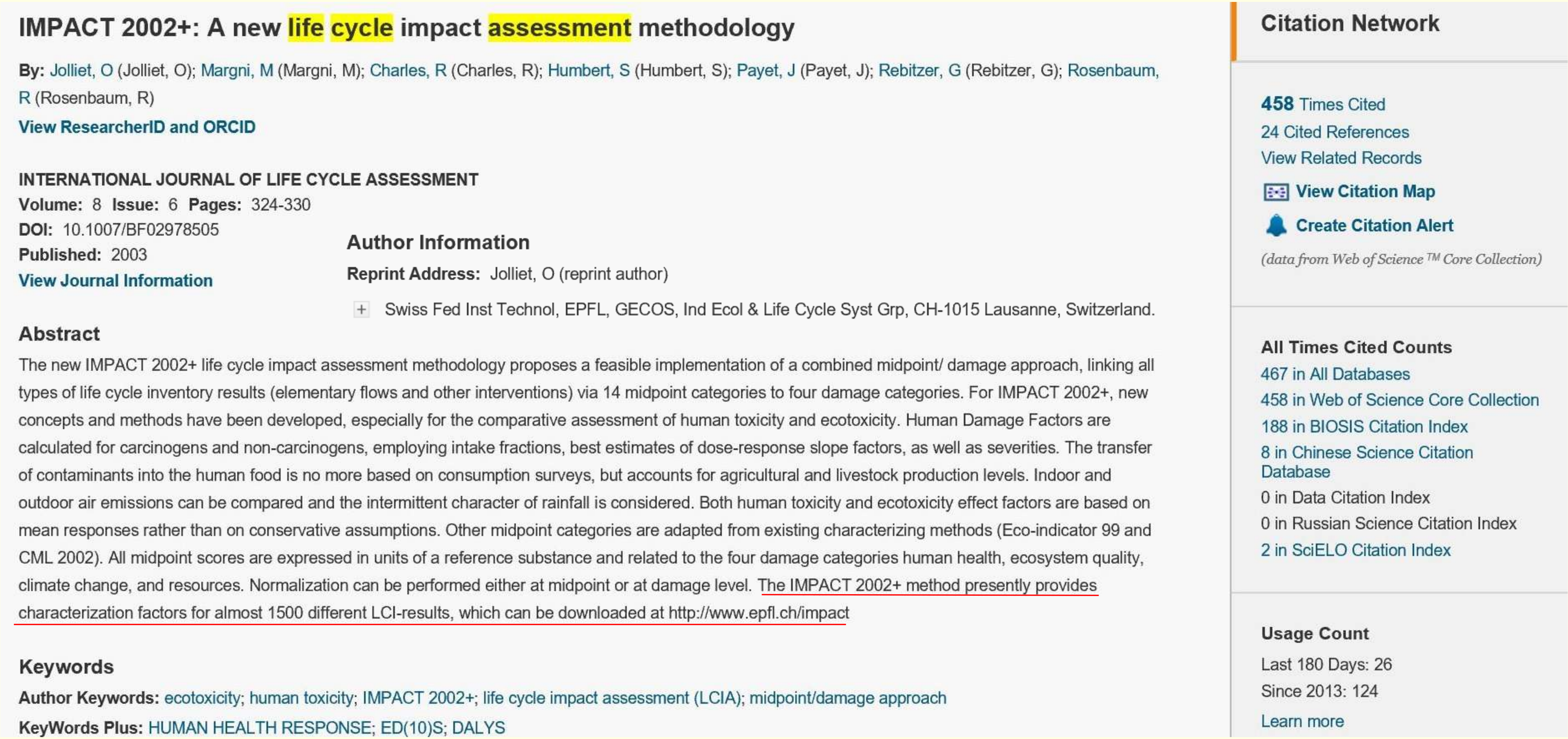
	2012 ◀	2013	2014	2015	2016 ▶	Total	Average Citations per Year
	5195	7297	9030	10593	3814	48651	1520.34
1. **Recent developments in Life Cycle Assessment** By: Finnveden, Goran; Hauschild, Michael Z.; Ekvall, Tomas; et al. JOURNAL OF ENVIRONMENTAL MANAGEMENT Volume: 91 Issue: 1 Pages: 1-21 Published: OCT 2009	92	110	158	150	48	642	80.25
2. **Life-Cycle Assessment of Biodiesel Production from Microalgae** By: Lardon, Laurent; Helias, Arnaud; Sialve, Bruno; et al. ENVIRONMENTAL SCIENCE & TECHNOLOGY Volume: 43 Issue: 17 Pages: 6475-6481 Published: SEP 1 2009	75	100	112	107	20	492	61.50
3. **IMPACT 2002+: A new life cycle impact assessment methodology** By: Jolliet, O; Margni, M; Charles, R; et al. INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT Volume: 8 Issue: 6 Pages: 324-330 Published: 2003	54	67	64	79	29	458	32.71
4. **Applications of life cycle assessment to NatureWorks (TM) polylactide (PLA) production** By: Vink, ETH; Rabago, KR; Glassner, DA; et al. POLYMER DEGRADATION AND STABILITY Volume: 80 Issue: 3 Pages: 403-419 Published: JUN 2003	47	52	41	42	12	423	30.21
5. **Life cycle assessment Part 1: Framework, goal and scope definition, inventory analysis, and applications** By: Rebitzer, G; Ekvall, T; Frischknecht, R; et al. ENVIRONMENT INTERNATIONAL Volume: 30 Issue: 5 Pages: 701-720 Published: JUL 2004	40	56	53	67	22	382	29.38
6. **USEtox-the UNEP-SETAC toxicity model: recommended characterisation factors for human toxicity and freshwater ecotoxicity in life cycle impact assessment** By: Rosenbaum, Ralph K.; Bachmann, Till M.; Gold, Lois Swirsky; et al. INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT Volume: 13 Issue: 7 Pages: 532-546 Published: NOV 2008	30	48	72	69	27	314	34.89
7. **Life-cycle assessment of net greenhouse-gas flux for bioenergy cropping systems** By: Adler, Paul R.; Del Grosso, Stephen J.; Parton, William J. ECOLOGICAL APPLICATIONS Volume: 17 Issue: 3 Pages: 675-691 Published: APR 2007	34	42	45	38	10	283	28.30
8. **Life cycle assessment of various cropping systems utilized for producing biofuels: Bioethanol and biodiesel** By: Kim, S; Dale, BE BIOMASS & BIOENERGY Volume: 29 Issue: 6 Pages: 426-439 Published: 2005	33	26	19	28	3	260	21.67
9. **A review of assessments conducted on bio-ethanol as a transportation fuel from a net energy, greenhouse gas, and environmental life cycle perspective** By: von Blottnitz, Harro; Curran, Mary Ann JOURNAL OF CLEANER PRODUCTION Volume: 15 Issue: 7 Pages: 607-619 Published: 2007	46	22	30	38	9	255	25.50
10. **Life cycle assessment of greenhouse gas emissions from plug-in hybrid vehicles: Implications for policy** By: Samaras, Constantine; Meisterling, Kyle ENVIRONMENTAL SCIENCE & TECHNOLOGY Volume: 42 Issue: 9 Pages: 3170-3176 Published: MAY 1 2008	45	43	33	42	4	235	26.11

- 综述类
- 方法类
  - 方法原理
  - 影响类别评估
  - 特定影响效应
- 应用类
  - 新技术
  - 新材料
  - 新产品
  - 新影响类别

高引用文献分析



IMPACT 2002+: A new life cycle impact assessment methodology

By: Jolliet, O (Jolliet, O); Margni, M (Margni, M); Charles, R (Charles, R); Humbert, S (Humbert, S); Payet, J (Payet, J); Rebitzer, G (Rebitzer, G); Rosenbaum, R (Rosenbaum, R)

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INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT
Volume: 8 **Issue:** 6 **Pages:** 324-330
DOI: 10.1007/BF02978505
Published: 2003
View Journal Information

Author Information

Reprint Address: Jolliet, O (reprint author)

+ Swiss Fed Inst Technol, EPFL, GECOS, Ind Ecol & Life Cycle Syst Grp, CH-1015 Lausanne, Switzerland.

Abstract

The new IMPACT 2002+ life cycle impact assessment methodology proposes a feasible implementation of a combined midpoint/ damage approach, linking all types of life cycle inventory results (elementary flows and other interventions) via 14 midpoint categories to four damage categories. For IMPACT 2002+, new concepts and methods have been developed, especially for the comparative assessment of human toxicity and ecotoxicity. Human Damage Factors are calculated for carcinogens and non-carcinogens, employing intake fractions, best estimates of dose-response slope factors, as well as severities. The transfer of contaminants into the human food is no more based on consumption surveys, but accounts for agricultural and livestock production levels. Indoor and outdoor air emissions can be compared and the intermittent character of rainfall is considered. Both human toxicity and ecotoxicity effect factors are based on mean responses rather than on conservative assumptions. Other midpoint categories are adapted from existing characterizing methods (Eco-indicator 99 and CML 2002). All midpoint scores are expressed in units of a reference substance and related to the four damage categories human health, ecosystem quality, climate change, and resources. Normalization can be performed either at midpoint or at damage level. The IMPACT 2002+ method presently provides characterization factors for almost 1500 different LCI-results, which can be downloaded at http://www.epfl.ch/impact

Keywords

Author Keywords: ecotoxicity; human toxicity; IMPACT 2002+; life cycle impact assessment (LCIA); midpoint/damage approach

KeyWords Plus: HUMAN HEALTH RESPONSE; ED(10)S; DALYS

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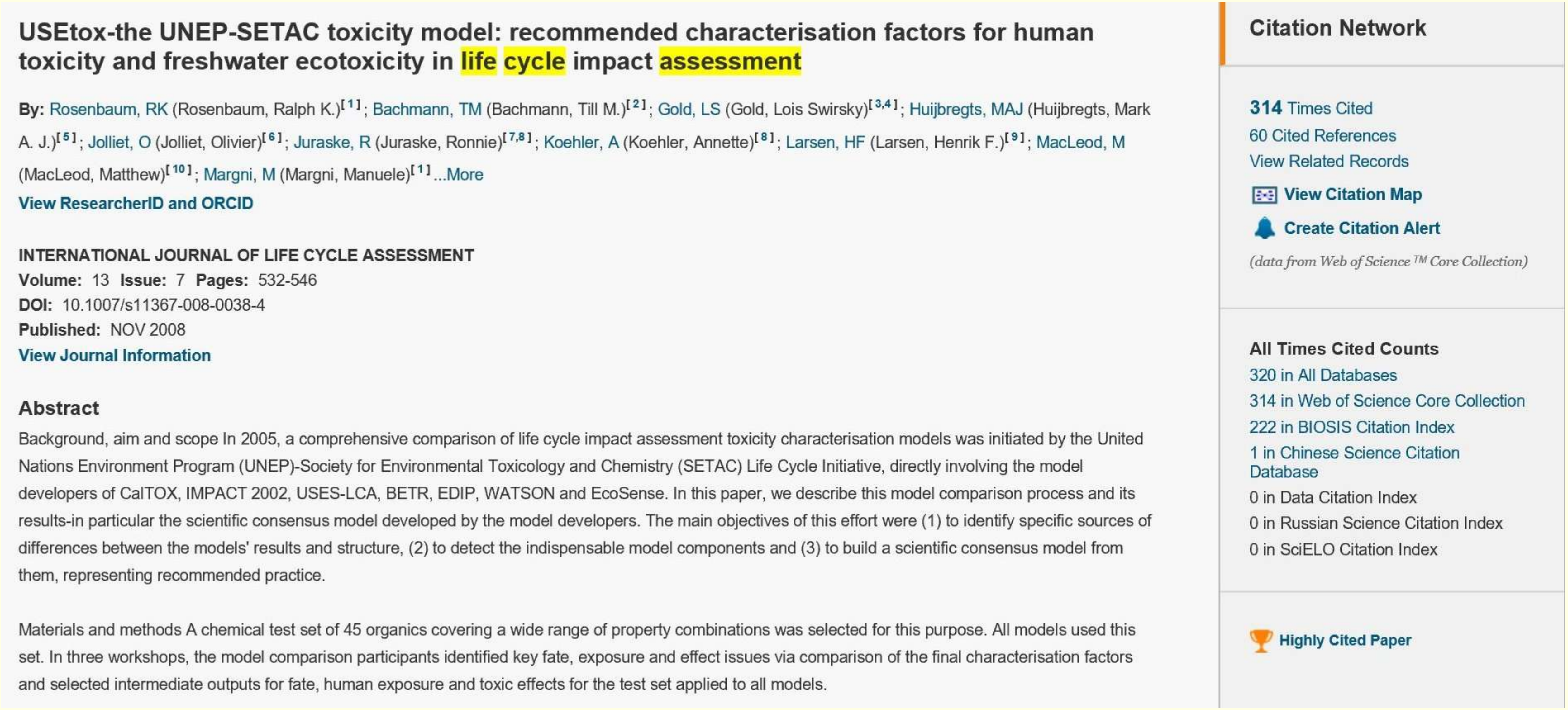

USEtox-the UNEP-SETAC toxicity model: recommended characterisation factors for human toxicity and freshwater ecotoxicity in life cycle impact assessment

By: Rosenbaum, RK (Rosenbaum, Ralph K.)[1]; Bachmann, TM (Bachmann, Till M.)[2]; Gold, LS (Gold, Lois Swirsky)[3,4]; Huijbregts, MAJ (Huijbregts, Mark A. J.)[5]; Jolliet, O (Jolliet, Olivier)[6]; Juraske, R (Juraske, Ronnie)[7,8]; Koehler, A (Koehler, Annette)[8]; Larsen, HF (Larsen, Henrik F.)[9]; MacLeod, M (MacLeod, Matthew)[10]; Margni, M (Margni, Manuele)[1] ...More

View ResearcherID and ORCID

INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT
Volume: 13 **Issue:** 7 **Pages:** 532-546
DOI: 10.1007/s11367-008-0038-4
Published: NOV 2008
View Journal Information

Abstract

Background, aim and scope In 2005, a comprehensive comparison of life cycle impact assessment toxicity characterisation models was initiated by the United Nations Environment Program (UNEP)-Society for Environmental Toxicology and Chemistry (SETAC) Life Cycle Initiative, directly involving the model developers of CalTOX, IMPACT 2002, USES-LCA, BETR, EDIP, WATSON and EcoSense. In this paper, we describe this model comparison process and its results-in particular the scientific consensus model developed by the model developers. The main objectives of this effort were (1) to identify specific sources of differences between the models' results and structure, (2) to detect the indispensable model components and (3) to build a scientific consensus model from them, representing recommended practice.

Materials and methods A chemical test set of 45 organics covering a wide range of property combinations was selected for this purpose. All models used this set. In three workshops, the model comparison participants identified key fate, exposure and effect issues via comparison of the final characterisation factors and selected intermediate outputs for fate, human exposure and toxic effects for the test set applied to all models.

Citation Network

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60 Cited References
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All Times Cited Counts
320 in All Databases
314 in Web of Science Core Collection
222 in BIOSIS Citation Index
1 in Chinese Science Citation Database
0 in Data Citation Index
0 in Russian Science Citation Index
0 in SciELO Citation Index

Highly Cited Paper

高引用文献分析

Life-Cycle Assessment of Biodiesel Production from Microalgae

By: Lardon, L (Lardon, Laurent)[1]; Helias, A (Helias, Arnaud)[1,2]; Sialve, B (Sialve, Bruno)[3]; Steyer, JP (Stayer, Jean-Philippe)[1]; Bernard, O (Bernard, Olivier)[3]

View ResearcherID and ORCID

ENVIRONMENTAL SCIENCE & TECHNOLOGY
Volume: 43 **Issue:** 17 **Pages:** 6475-6481
DOI: 10.1021/es900705j
Published: SEP 1 2009
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Abstract

This paper provides an analysis of the potential environmental impacts of biodiesel production from microalgae. High production yields of microalgae have called forth interest of economic and scientific actors but it is still unclear whether the production of biodiesel is environmentally interesting and which transformation steps need further adjustment and optimization. A comparative LCA study of a virtual facility has been undertaken to assess the energetic balance and the potential environmental impacts of the whole process chain, from the biomass production to the biodiesel combustion. Two different culture conditions, nominal fertilizing or nitrogen starvation, as well as two different extraction options, dry or wet extraction, have been tested. The best scenario has been compared to first generation biodiesel and oil diesel. The outcome confirms the potential of microalgae as an energy source but highlights the imperative necessity of decreasing the energy and fertilizer consumption. Therefore control of nitrogen stress during the culture and optimization of wet extraction seem to be valuable options. This study also emphasizes the potential of anaerobic digestion of oilcakes as a way to reduce external energy demand and to recycle a part of the mineral fertilizers.

Keywords

KeyWords Plus: CHLORELLA-VULGARIS; WASTE-WATER; INCREASE; BIOMASS

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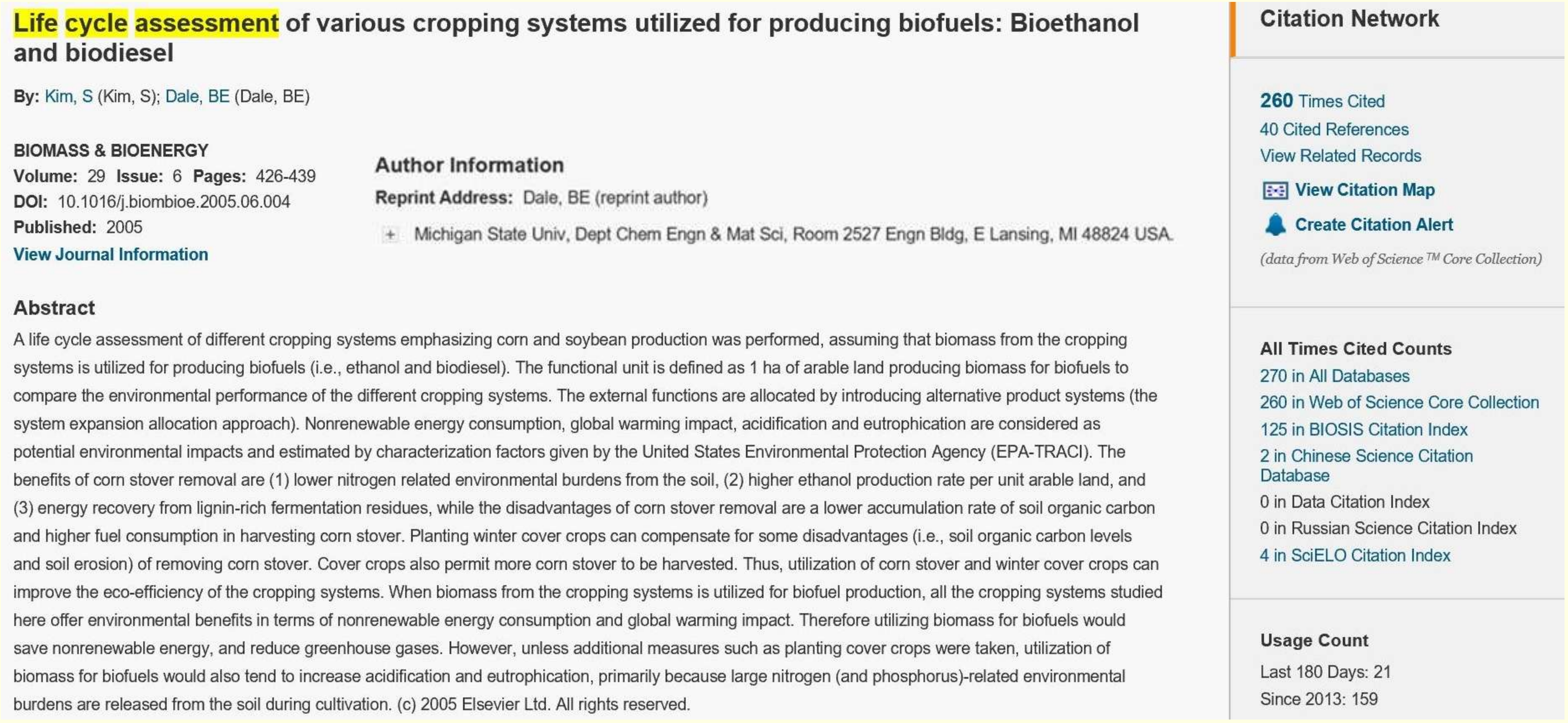

Life cycle assessment of various cropping systems utilized for producing biofuels: Bioethanol and biodiesel

By: Kim, S (Kim, S); Dale, BE (Dale, BE)

BIOMASS & BIOENERGY
Volume: 29 **Issue:** 6 **Pages:** 426-439
DOI: 10.1016/j.biombioe.2005.06.004
Published: 2005
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Abstract

A life cycle assessment of different cropping systems emphasizing corn and soybean production was performed, assuming that biomass from the cropping systems is utilized for producing biofuels (i.e., ethanol and biodiesel). The functional unit is defined as 1 ha of arable land producing biomass for biofuels to compare the environmental performance of the different cropping systems. The external functions are allocated by introducing alternative product systems (the system expansion allocation approach). Nonrenewable energy consumption, global warming impact, acidification and eutrophication are considered as potential environmental impacts and estimated by characterization factors given by the United States Environmental Protection Agency (EPA-TRACI). The benefits of corn stover removal are (1) lower nitrogen related environmental burdens from the soil, (2) higher ethanol production rate per unit arable land, and (3) energy recovery from lignin-rich fermentation residues, while the disadvantages of corn stover removal are a lower accumulation rate of soil organic carbon and higher fuel consumption in harvesting corn stover. Planting winter cover crops can compensate for some disadvantages (i.e., soil organic carbon levels and soil erosion) of removing corn stover. Cover crops also permit more corn stover to be harvested. Thus, utilization of corn stover and winter cover crops can improve the eco-efficiency of the cropping systems. When biomass from the cropping systems is utilized for biofuel production, all the cropping systems studied here offer environmental benefits in terms of nonrenewable energy consumption and global warming impact. Therefore utilizing biomass for biofuels would save nonrenewable energy, and reduce greenhouse gases. However, unless additional measures such as planting cover crops were taken, utilization of biomass for biofuels would also tend to increase acidification and eutrophication, primarily because large nitrogen (and phosphorus)-related environmental burdens are released from the soil during cultivation. (c) 2005 Elsevier Ltd. All rights reserved.

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四、LCA在环境管理中的应用

建设项目环境影响评价-工程分析

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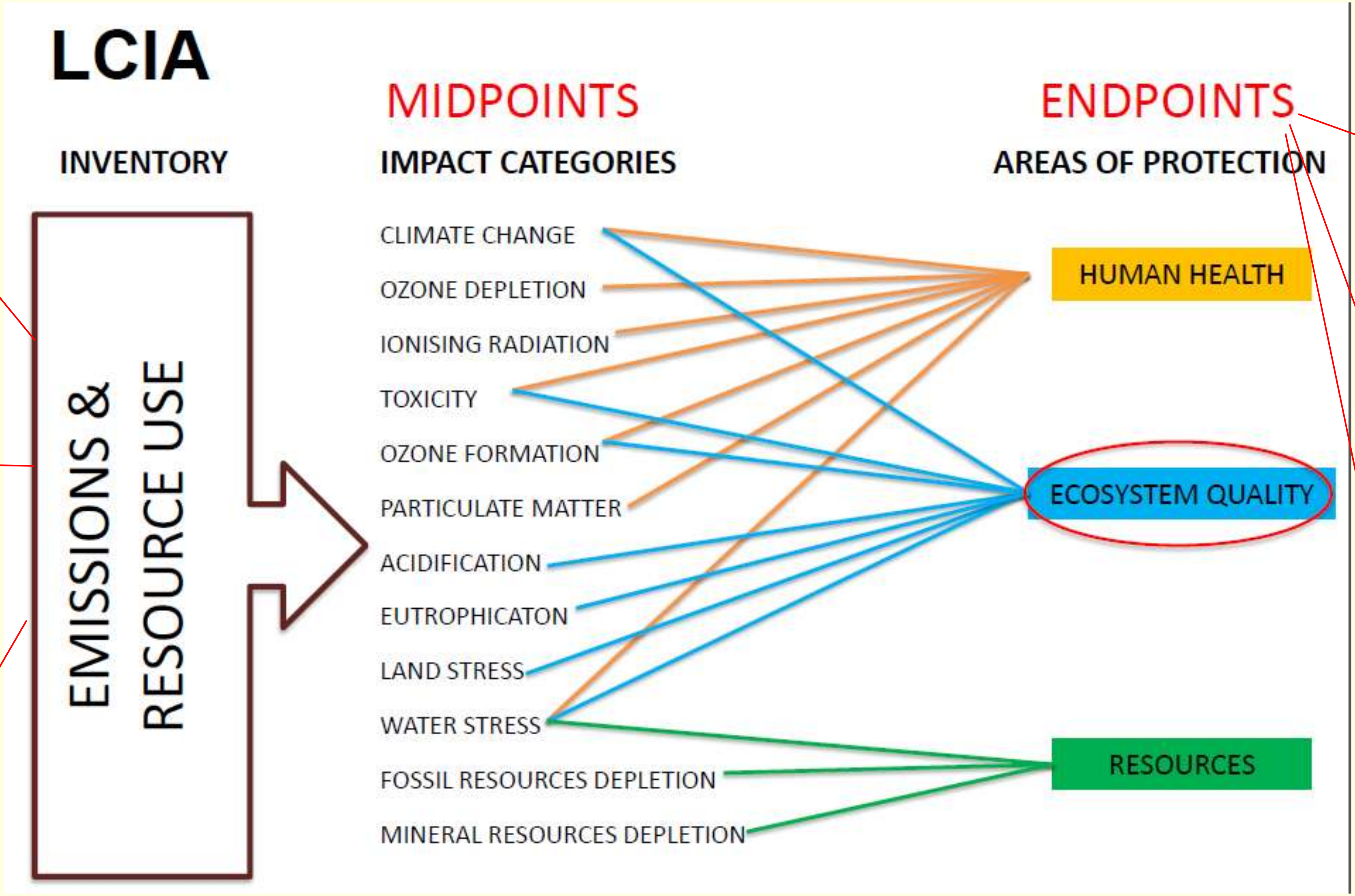
人类活动的区域资源环境影响预测



优选清洁产品或技术目录

建立环境标识制度

定量评估区域产业发展规划

五、课题组在LCA方面的一些工作

- 终端消费品生命周期评估
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  - 服装（纯棉T-shirt）、床上用品（四件套）
  - 家电（冰箱、洗衣机、回收及拆解）
  - 光伏发电
- 典型污染物环境效应
  - 湖泊生态系统氮磷物质的生态效应
- 区域特定人类活动的环境效应评估
  - 中国高分辨富营养化潜势图谱

LIFE CYCLE IMPACT ASSESSMENT (LCIA)

Life-cycle assessment of continuous pad-dyeing technology for cotton fabrics

LCA FOR MACHINES

Life cycle assessment of horizontal-axis washing machines in China

LIFE CYCLE SUSTAINABILITY ASSESSMENT

Life cycle assessment of cotton T-shirts in China

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Life cycle assessment of water reuse systems in an industrial park

Le Tong [a], Xin Liu [a], Xuewei Liu [a], Zengwei Yuan [a,*], Qiong Zhang [b]

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[b] Civil and Environmental Engineering Department, University of South Florida, 4202 East Fowler Av. ENB118, USA

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Life-cycle phosphorus management of the crop production–consumption system in China, 1980–2012

Huijun Wu [a], Zengwei Yuan [b,*], Liangmin Gao [a], Ling Zhang [c], Yongliang Zhang [d]

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[b] State Key Laboratory of Pollution Control and Resource Reuse, School of the Environment, Nanjing University, Nanjing 210023, PR China
[c] College of Economics and Management, Nanjing Forestry University, Nanjing 210037, PR China
[d] Policy Research Center for Environment and Economy, Ministry of Environmental Protection, Beijing 100029, PR China

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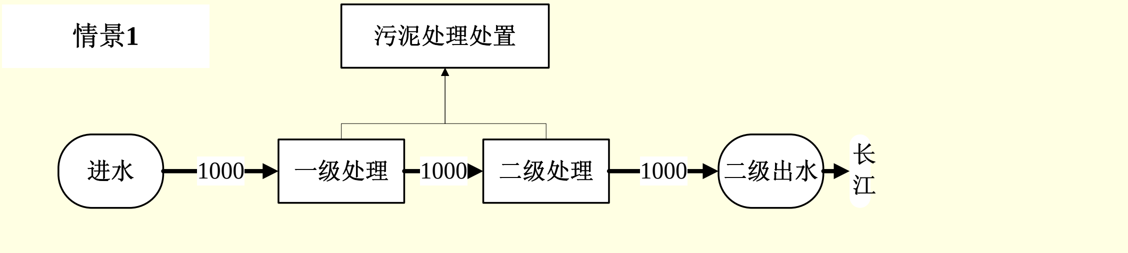
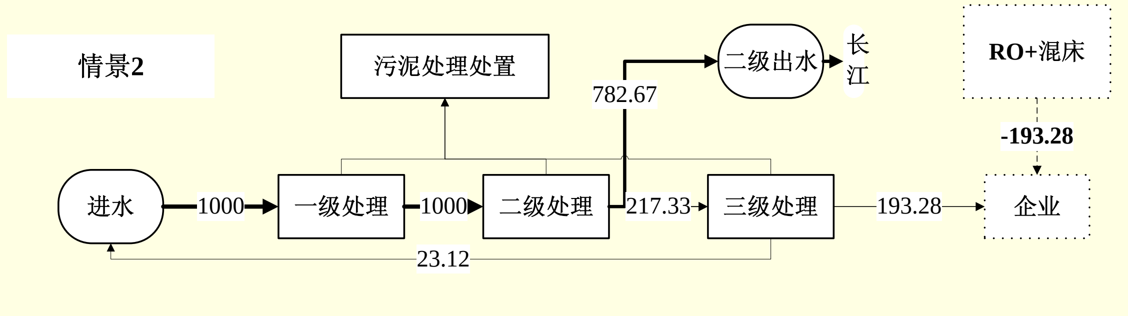
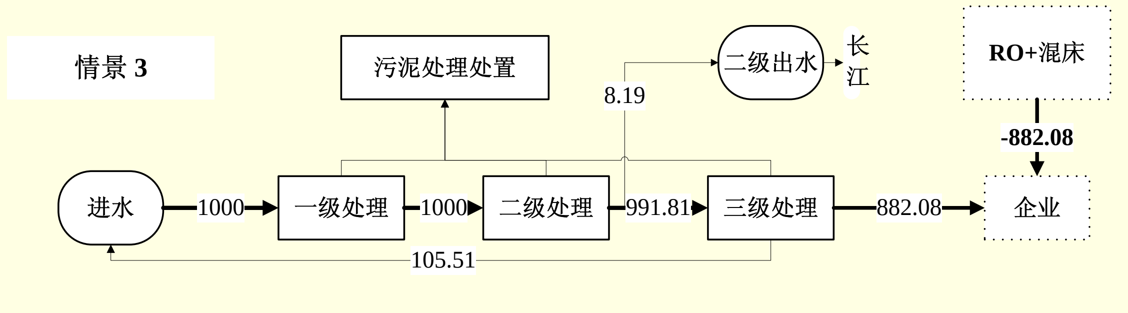
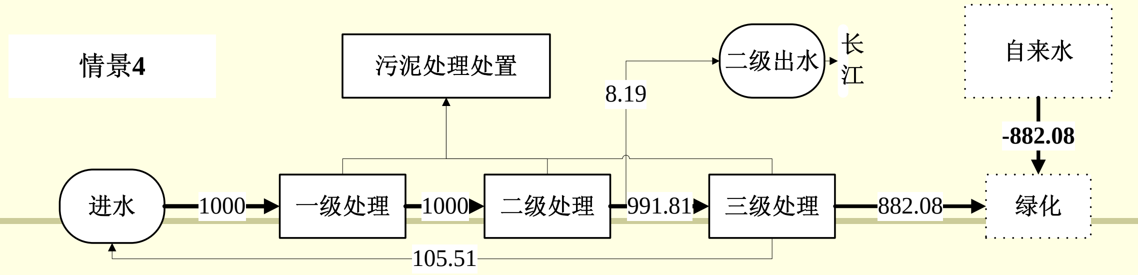
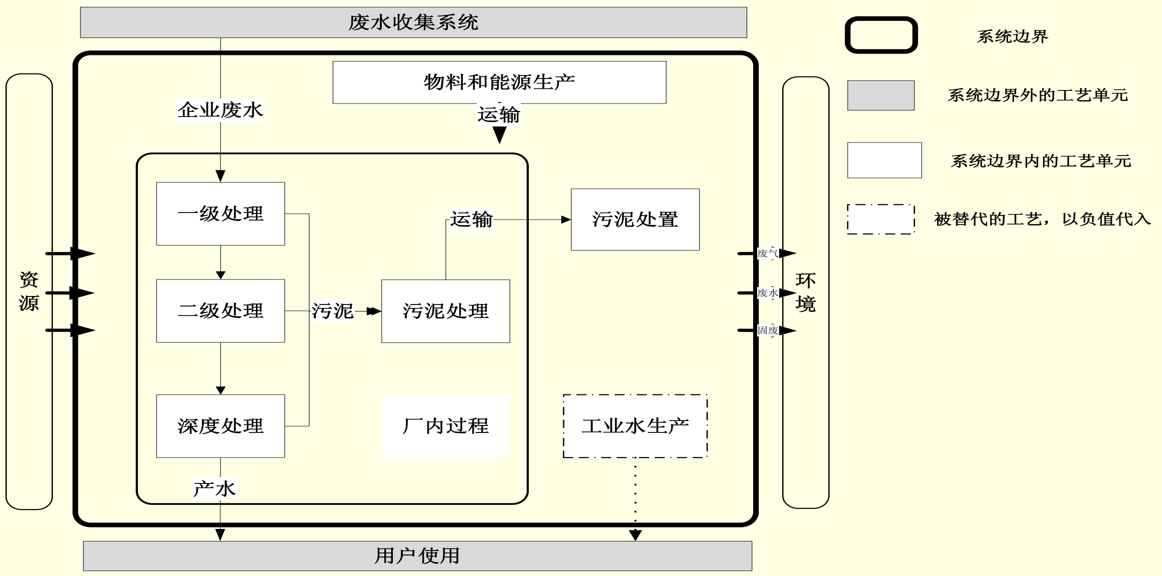
案例1





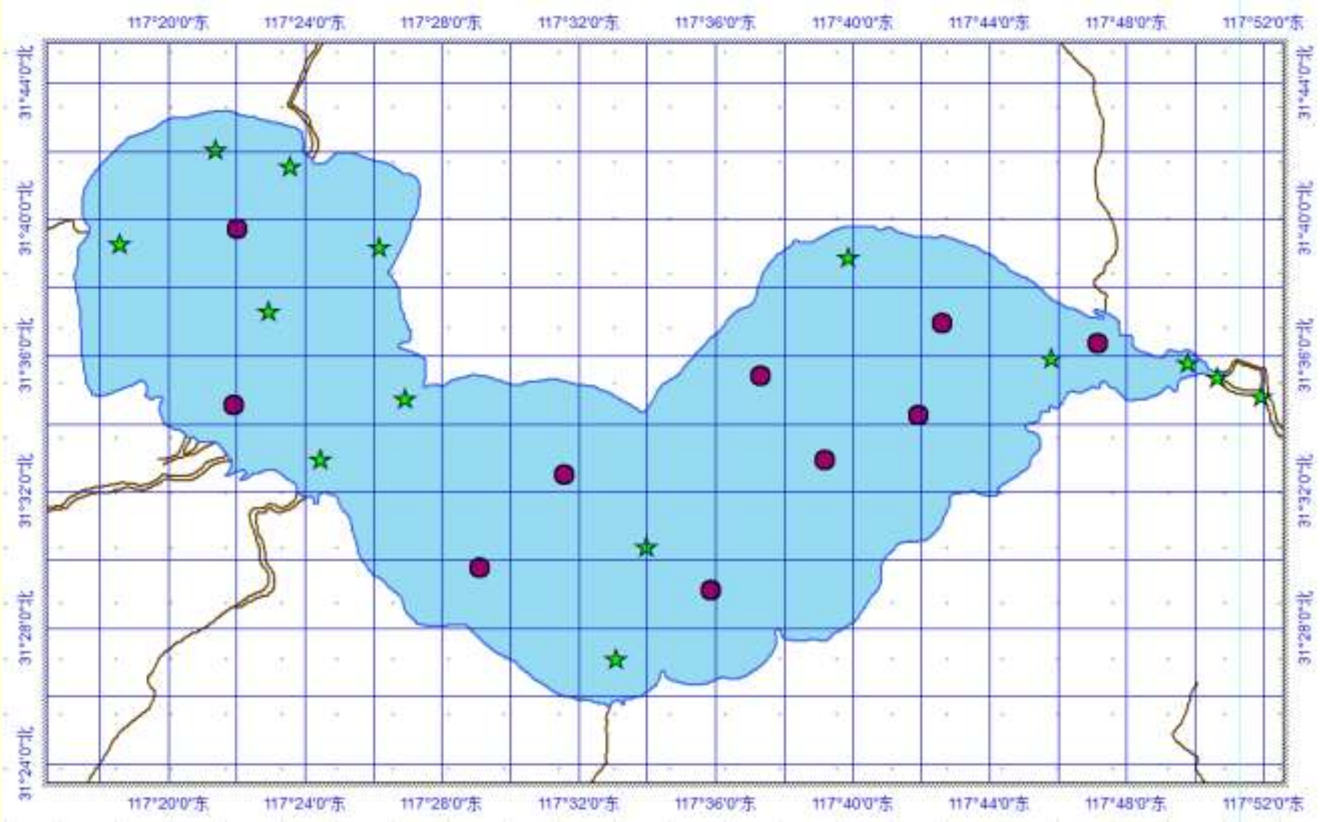


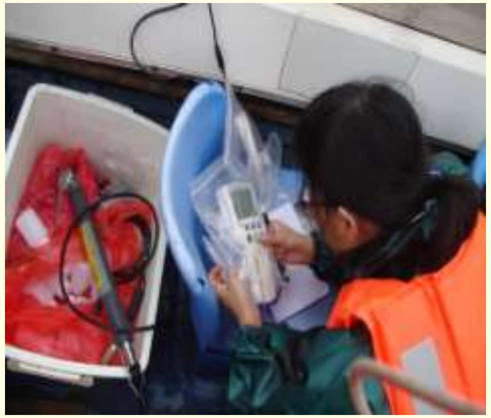




- 工业废水深度处理显著增加环境影响，若回用于工业，当回用率为20%时，水资源消耗减小但有轻微环境影响产生；当回用率达到60%以上时，系统不仅节约大量水资源，同时显著减小环境影响。

湖泊生态系统氮磷物质的生态效应





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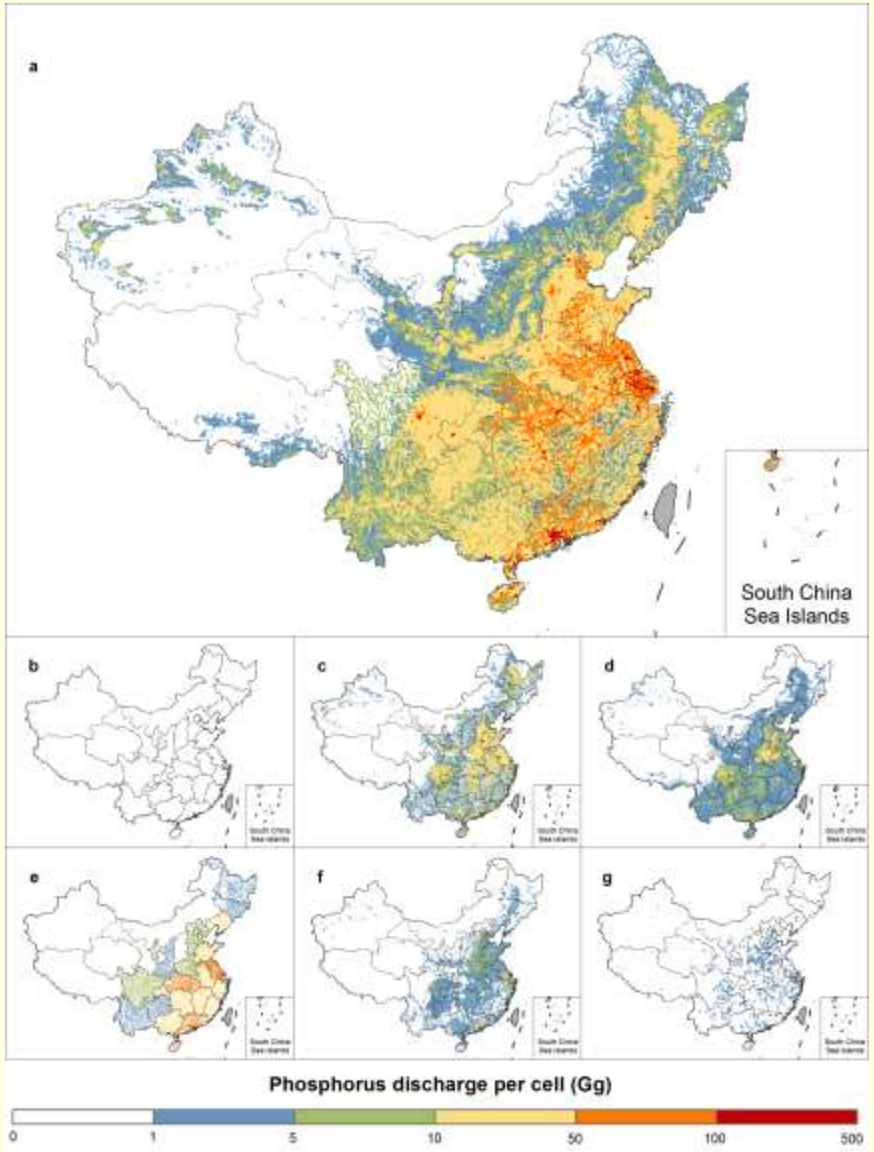

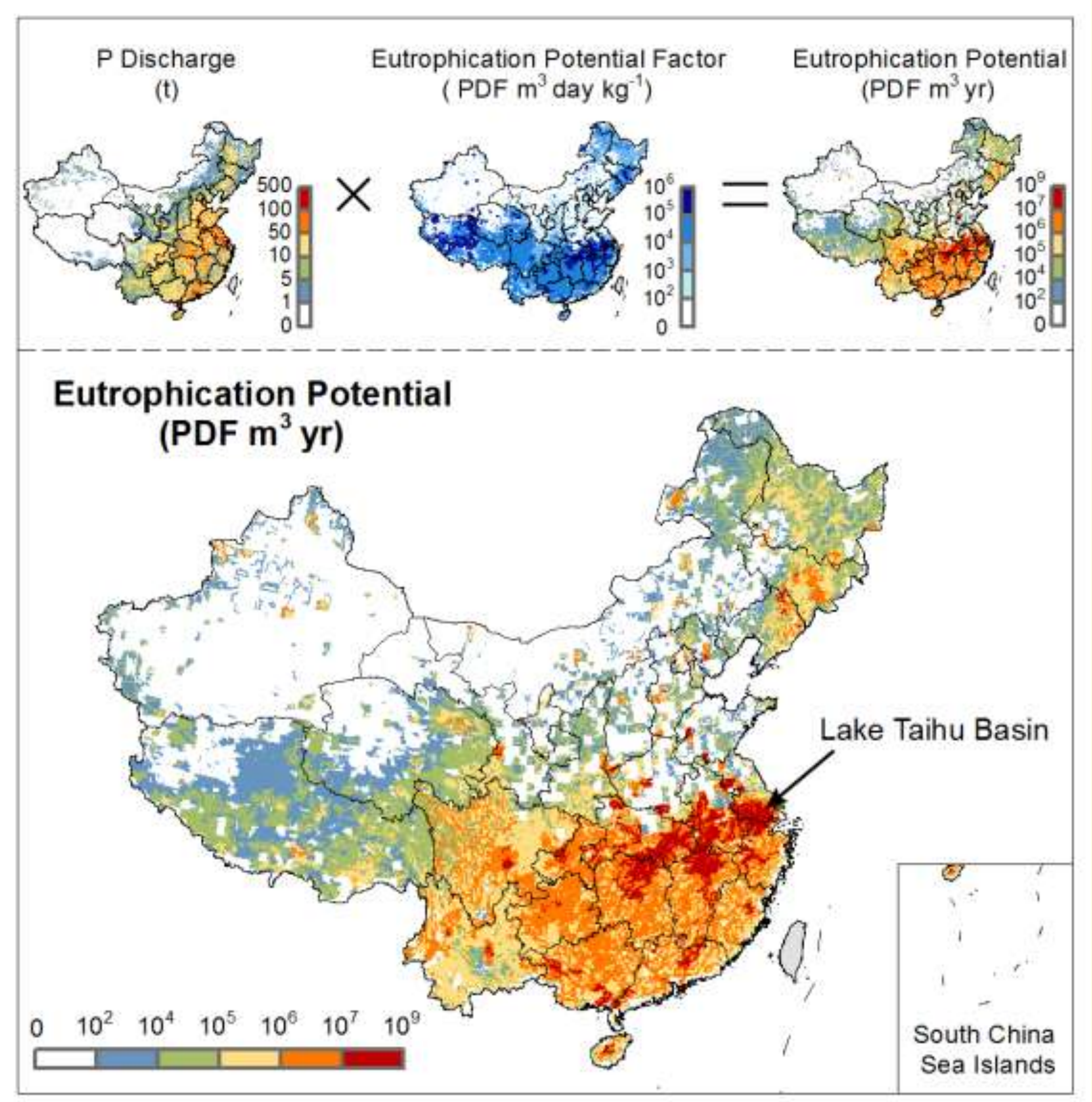

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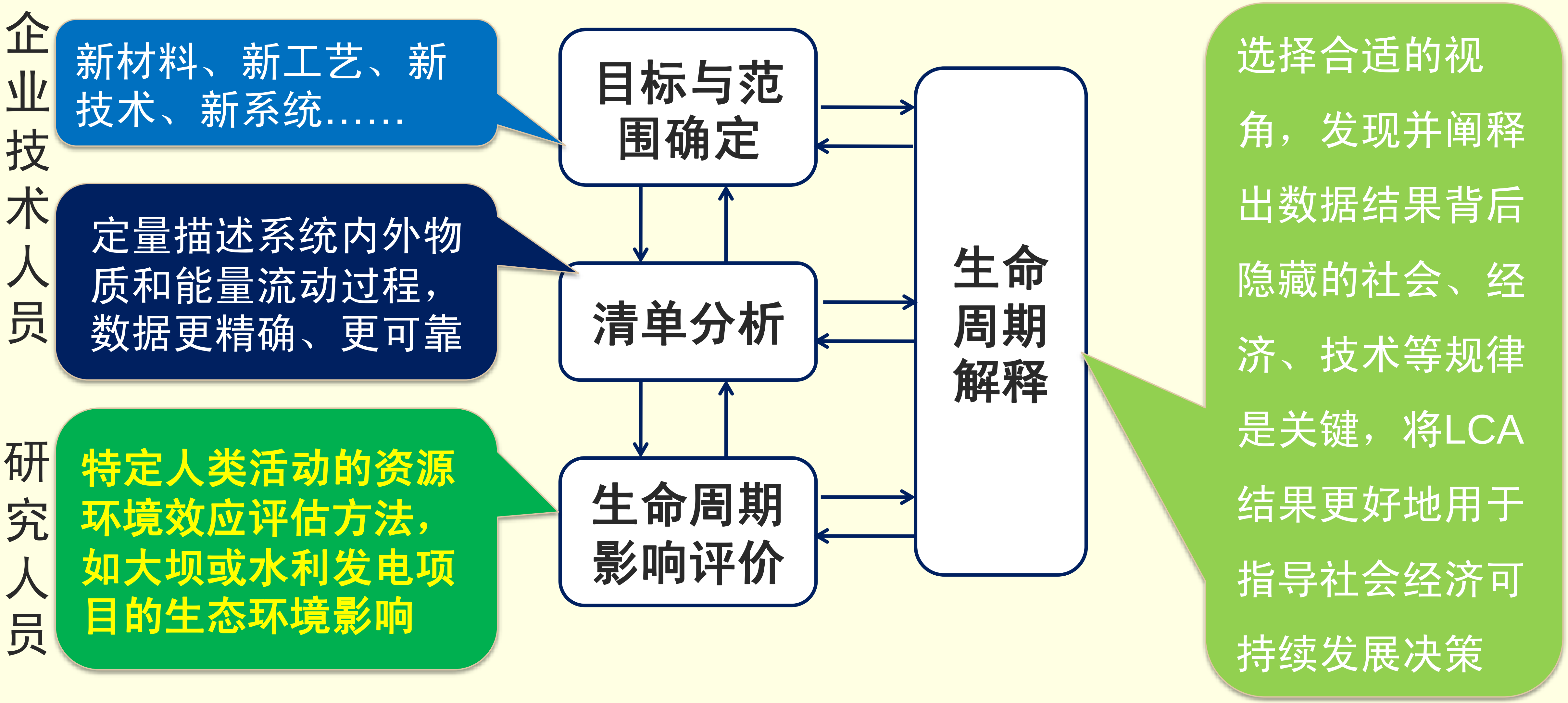
总结



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新材料、新工艺、新技术、新系统……

定量描述系统内外物质和能量流动过程，数据更精确、更可靠

研究人员

特定人类活动的资源环境效应评估方法，如大坝或水利发电项目的生态环境影响

目标与范围确定

清单分析

生命周期影响评价

生命周期解释

选择合适的视角，发现并阐释出数据结果背后隐藏的社会、经济、技术等规律是关键，将LCA结果更好地用于指导社会经济可持续发展决策

欢迎批评指正！

袁增伟

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