GENERAL FICHE
LANDSCAPE FEATURES

Data extracted in October 2021

Note to the reader: This *general fiche* summarises the environmental and climate impacts of LANDSCAPE FEATURES found in a systematic review of 34 synthesis research papers[1]. These papers were selected, according to our inclusion criteria, from an initial number of 244 obtained through a systematic literature search strategy[2].

The general fiche provides the highest level of synthesis – symbolised by the top of the pyramid. As each synthesis research paper involves a number of individual papers - ranging from 9 to 300, the assessment of impacts relies on a large number of results obtained mainly in field experiments (carried out in situations close to real farming environment), and sometimes in lab experiments or from model simulations.

In addition to this general fiche, *single-impact fiches* provide a deeper insight in each individual impact of different LANDSCAPE FEATURES (on carbon sequestration, nutrient leaching and run-off, pest control, biodiversity, pollination, soil erosion, soil nutrients, water quality, water retention, animal production and crop yield), with more detailed information – medium part of the pyramid.

Finally, *individual reports* provide fuller information about the results reported in each synthesis paper, in particular about the modulation of effects by factors related to soil, climate and management practices – base of the pyramid.

This general fiche on LANDSCAPE FEATURES is part of a set of similar fiches providing a comprehensive picture of the impacts of farming practices on climate and the environment.

1. DESCRIPTION OF THE FARMING PRACTICE

Description	• Landscape features are small fragments of natural or semi-natural vegetation in agricultural landscape, which provide ecosystem services and support for biodiversity. Historically, farmers have taken advantage of the natural elements already present in the agricultural landscapes or have created them for various purposes: to use their wood, to create shelter for crops and livestock as well as windbreak barriers, to delimit parcels, or to be able to cultivate on land with steep slope[3].
Key descriptors	• In most policy documents landscape features are defined as a group/list of subtypes ("features"), such as hedges, ponds, ditches, trees in line, in group or isolated, field margins, terraces, dry-stone or earth walls, vegetated areas, individual monumental trees, water streams, springs or historic canal networks. Nevertheless, there is no standard definition and typology of landscape features, and there are different interpretations in the various sectors and disciplines. This review applies an **ad hoc "typology"**, synthesized from the feature types addressed in the scientific literature (i.e., it is not an exhaustive list but comprises only the features found in the literature that meet the requirements to be included

[1] Synthesis research papers include either meta-analysis or systematic reviews with quantitative results.
[2] For further details on the search strategy and inclusion criteria, see section 4 in single-impact fiches.
[3] Eurostat (2013). Archive: Agriculture -landscape features. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Agriculture_-_landscape_features

in our review). This typology **includes** twelve (in some cases, partly overlapping) classes of landscape features:

- Landscape features in general covers all features comprising small areas of permanent non-productive semi-natural vegetation embedded in farmlands, as well as anthropogenic structures such as stone walls. This broad class can involve various types of vegetation (woody, grassy, or wetland), either as historical legacies/remnants[4] or newly established habitat islands. This class covers a large fraction of other more specific landscape feature classes (e.g. hedgerows, field margins), in order to host studies that did not make the distinction between the finer classes below.
- Buffer strips are narrow linear non-cultivated areas interposed between fields and water streams covered in semi-natural (typically grassland or wetland) vegetation, which are created / retained / managed in order to intercept and treat the waters leaving the cropland[5].
- Ditches are small human-made linear surface depressions covered by water and/or wetland vegetation, embedded in an agricultural landscape. Ditches are typically created for the purpose of irrigation, drainage, and/or soil erosion prevention[6].
- Field margins are narrow linear areas on agricultural field borders covered in permanent herbaceous vegetation, which are never intentionally fertilized, sprayed, or tilled[7].
- Flower strips are small, often linear parts of arable fields that are intentionally sown by the farmers with non-productive flowering plants for biodiversity benefits[8].
- Hedgerows are narrow linear areas on agricultural field borders covered in unfertilized perennial woody vegetation (shrubs and/or trees)[7].
- Isolated trees are non-productive trees occurring dispersed / scattered in croplands and/or grasslands, typically as legacies of historical vegetation and land uses[9].
- Ponds are small surface depressions covered by water and possibly a narrow strip of wetland vegetation, embedded in an agricultural landscape[10].
- Small wetlands are small transiently flooded surface depressions covered in wetland vegetation and embedded in an agricultural landscape. This class includes the remnants of historical wetland or freshwater ecosystems, and

[4] A remnant natural area, also known as remnant habitat, is an ecological community containing native flora and fauna that has not been significantly disturbed by activities such as tillage, logging, pollution, urbanization, modification of fire regime, or non-native species invasion.
[5] Borin et al., 2010. Multiple functions of buffer strips in farming areas. *European Journal of Agronomy*, *32*(1), 103-111.
[6] Dollinger et al., 2015. Managing ditches for agroecological engineering of landscape. A review. *Agronomy for Sustainable Development*, 35, 999-1020.
[7] Van Vooren et al., 2017. Ecosystem service delivery of agri-environment measures: a synthesis for hedgerows and grass strips on arable land. *Agriculture, Ecosystems and Environment* 244, 32-51.
[8] EIP-AGRI Focus Group. Benefits of landscape features for arable crop production. Final Report. 7 March 2016. https://ec.europa.eu/eip/agriculture/sites/default/files/eip-agri_fg_ecological-focus-areas_final-report_en.pdf.
[9] Prevedello et al., 2018. The importance of scattered trees for biodiversity conservation: A global meta-analysis. *Journal of Applied Ecology*, 55, 205-214.
[10] Chen et al., 2019. Farm ponds in southern China: Challenges and solutions for conserving a neglected wetland ecosystem. *Science of The Total Environment*, 659, 1322-1334.

	human-made "constructed wetlands" created for treating wastewaters or as a refuge for species[11]. - Stone walls are rocky vertical surfaces with a variety of typologies. These long-standing anthropogenic structures are used since prehistory as retaining walls and/or as field boundaries. The ages of stone walls has increased their likelihood of exposure to various biotic and abiotic factors, allowing for the establishment of peculiar communities[12]. - Terraces are anthropogenic structures on sloping terrains created to permit or facilitate cultivation and to reduce the risk of erosion. Terraces consist of one or more "steps" (steep sections covered permanent woody or grassy vegetation or stone walls) and "land blocks" (flat sections that are used for agricultural production, separated by the steps). The specific size, appearance, choice of construction material (i.e., earth, stone or brick), age, land use/vegetation cover of terracing may differ across biogeographical areas[13]. - Trees in group are small patchy areas of woody vegetation (including trees, shrubs and herbs) embedded in an agricultural landscape. They can range from ancient native woodland remnants, to new plantations of non-native species. • This review **includes** spatial and temporal comparisons between agricultural land (cropland or grassland) with and without landscape features embedded within the farm or with and without landscape features within the surrounding agricultural landscape. That is, studies at the landscape scale were only considered if the landscape surrounding the cropland or grassland has an agricultural use (e.g., no urban or forested landscapes were considered). Spatial comparisons were simultaneously conducted between nearby agricultural lands. Temporal comparisons were conducted in the same agricultural land before and after the establishment or creation of the landscape feature. • This review only **includes** impacts measured in the cropland or grassland with the landscape features embedded or in their surrounding agricultural landscape. The effect of landscape features in other land uses are not included. This review **does not include** studies in agroforestry (→) nor in fallowing (→), which are assessed in separate sets of fiches.

2. DESCRIPTION OF THE IMPACTS OF THE FARMING PRACTICE ON CLIMATE AND THE ENVIRONMENT

[11] Vymazal, 2007. Removal of nutrients in various types of constructed wetlands. *Science of Total Environment*, 380(1-3), 48-65.
[12] Manenti, 2014. Dry stone walls favour biodiversity: a case-study from the Appennines. Biodiversity and Conservation, 23, 1879–1893.
[13] Wei et al., 2016. Global synthesis of the classifications, distributions, benefits and issues of terracing. *Earth-Science Reviews*, 159, 388-403.

We reviewed the impacts of different landscape features in agricultural land (cropland or grassland) compared to agricultural land without the corresponding landscape features.

The table below shows the number of synthesis papers reporting positive, negative or no effect, based on the statistical comparison of the intervention and the control. In addition, we include the number of systematic reviews reporting relevant results, but without statistical test of the effects ("uncertain"). For each impact, the effect with the higher score is marked in bold and the cell coloured. The numbers between parentheses indicate the number of synthesis papers with a quality score of at least 50%. Details on quality criteria can be found in this document →.

Out of the 34 synthesis papers selected, 28 reported studies conducted in Europe and 26 have a quality score higher than 50%. Some synthesis papers reported more than one impact.

Impact	Intervention	Positive	Negative	No effect	Uncertain*1
Increase carbon sequestration	Field margins	**1 (1)**	0	0	0
	Hedgerows	**3 (3)**	0	1(0)	1 (0)
	Isolated trees	0	0	0	**1 (0)**
	Terraces	**1 (1)**	0	**1 (1)**	0
Decrease nutrient leaching and run-off	Buffer strips	**4 (4)**	0	0	1 (0)
	Ditches and ponds	**1 (1)**	0	0	1 (0)
	Field margins	**1 (1)**	0	0	0
	Hedgerows	**1 (1)**	0	0	0
	Small wetlands	**1 (1)**	0	0	0
Increase pest control	Landscape features in general	**1 (1)**	0	**1 (1)**	0
	Field margins	**2 (2)**	0	0	0
	Flower strips	**1 (1)**	0	0	0
	Hedgerows	2 (2)	0	**3 (3)**	0
Increase biodiversity*2	Landscape features in general	**1 (1)**	0	0	1(1)
	Buffer strips	0	0	0	**1 (0)**
	Flower strips	0	0	0	**1 (0)**
	Hedgerows	0	0	0	**1 (0)**
	Isolated trees	0	0	0	**1 (0)**
	Trees in group	0	0	0	**1 (0)**
Increase pollination	Field margins	**3 (3)**	0	0	0
	Flower strips	**3 (3)**	0	**3 (3)**	0
	Hedgerows	0	0	**1 (1)**	0

Decrease soil erosion	Buffer strips	**3 (2)**	0	1 (0)	2 (0)
	Field margins	**2 (2)**	0	0	0
	Hedgerows	**3 (3)**	0	1 (1)	0
	Terraces	**4 (3)**	0	1 (0)	1 (0)
	Trees in group	0	0	0	**1 (0)**
Increase soil nutrients	Hedgerows	**1 (1)**	0	**1 (1)**	0
	Terraces	0	0	0	**1 (0)**
Increase water quality	Buffer strips	**1 (1)**	0	0	1 (0)
	Ditches	0	0	0	**1 (0)**
	Small wetlands	**1 (1)**	0	0	0
Increase water retention	Terraces	**1 (1)**	0	0	1 (0)
Increase animal production	Hedgerows	0	0	0	**1 (0)**
	Isolated trees	0	0	0	**1 (0)**
Increase crop yield	Field margins	**1 (1)**	0	0	0
	Flower strips	0	0	**3 (3)**	0
	Hedgerows	0	0	1 (1)	**2 (1)**
	Isolated trees	0	0	**2 (2)**	0
	Terraces	**1 (1)**	**1 (1)**	**1 (1)**	1 (0)
	Trees in group	**1 (1)**	0	0	0

*1 Number of systematic reviews that report relevant results but without statistical test comparison of the intervention and the control.

*2 The few meta-analyses on the effect of landscape features on biodiversity represent a general knowledge gap for this fiche. More detailed information can be found in the single-impact fiche on biodiversity. Furthermore, it should be noted that the impacts on natural enemies and pollinators also contribute to the impact on biodiversity; these results are described in the single-impact fiches on biodiversity for pest control and pollination, respectively.

3. DESCRIPTION OF THE KEY FACTORS INFLUENCING THE SIZE OF THE EFFECT

Only the factors explicitly studied in the reviewed synthesis papers with a significant effect are reported below. Details regarding the factors can be found in the *individual reports* following the hyperlinks (→).

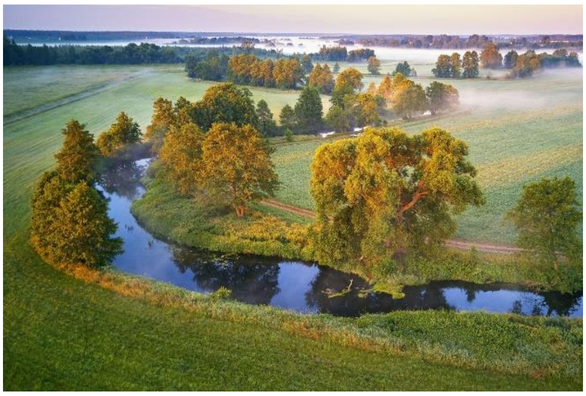
Impact	Factors
Increase carbon sequestration	Duration of intervention (ref 4), Distance to field edge (ref 18)
Decrease nutrient leaching and run-off	Temperature (ref 3, 19), Vegetation presence in ditch (ref 3), Construction material (ref 3), Inflow concentration (ref 3, 19), Duration of treatment (ref 14), Field edge width (ref 18), Hydraulic loading rate (ref 19), Wetland area (ref 19), Hydraulic loading (ref 19), Buffer width (ref 31, 33), Buffer vegetation type (ref 31, 33), Water flow path (ref 33)
Increase pest control	Distance to field edge (ref 5)
Increase pollination	Distance to field edge (ref 5), Time since treatment (ref 5), Flowering plant species richness (ref 5), Field edge management (ref 10), Field edge vegetation type (ref 10), Pollinator species (ref 10), Ecological contrast (difference in richness of plant communities between field margins and crop) (ref 13), Landscape structure (proportion of semi-natural habitats) (ref 13), Number of flower species in strip (ref 24)
Decrease soil erosion	Duration of intervention (ref 4), Land use (ref 16), Terrace type (ref 16), Geographical area (ref 16), Slope (ref 16, 17), Field edge vegetation type (ref 17), Field edge width (ref 18), Buffer width (ref 31, 32), Buffer slope (ref 31, 32), Buffer vegetation type (ref 31)
Increase water quality	Buffer width (ref 31)
Increase water retention	Land use (ref 7)
Increase crop yield	Buffer maturity (ref 2), Slope (ref 17), Distance to field edge (ref 18), Tree functional group (ref 23), Rainfall (ref 26)

4. IMPLEMENTATION IN THE PERIOD 2014-2020

GAEC Cross compliance	
Greening	
Rural development measure – submeasure	

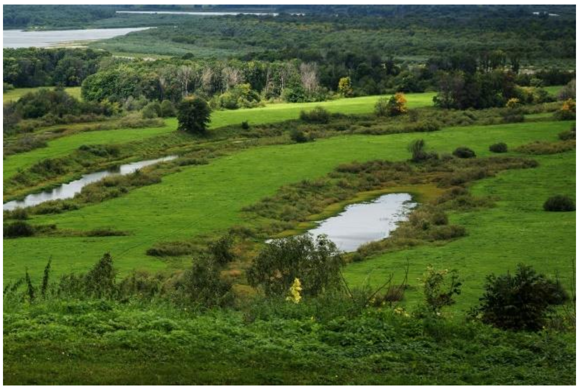
5. PICTURES

Buffer strips



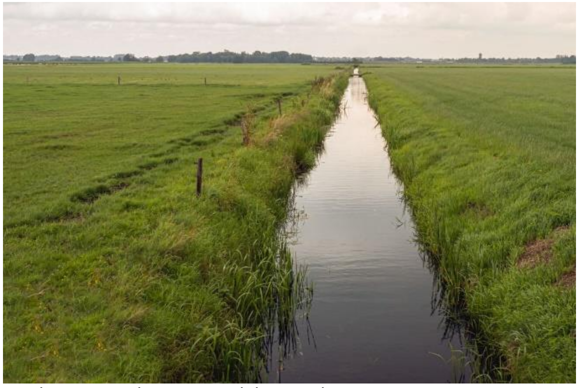
Credits: © weise_maxim / Adobe Stock 365166359

Wetlands



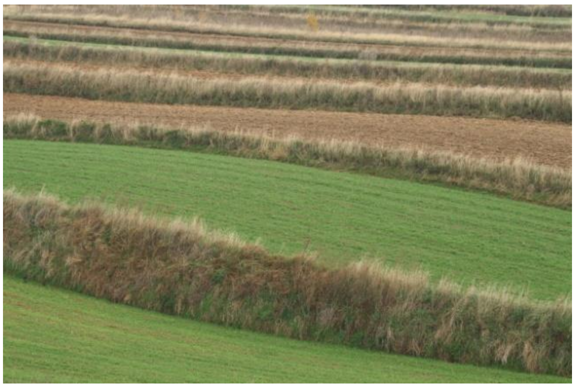
Credits: © olgamazina / Adobe Stock 350149400

Ditches



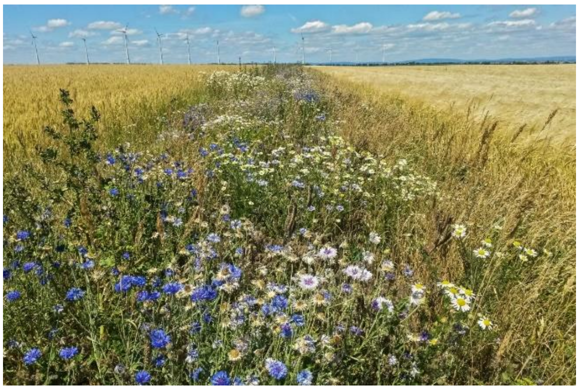
Credits: © Ruud Morijn / Adobe Stock 363181077

Field margins



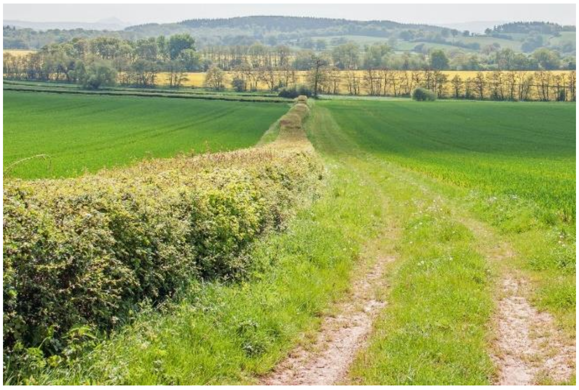
Credits: © pioregur / Adobe Stock 5080466

Flower strips

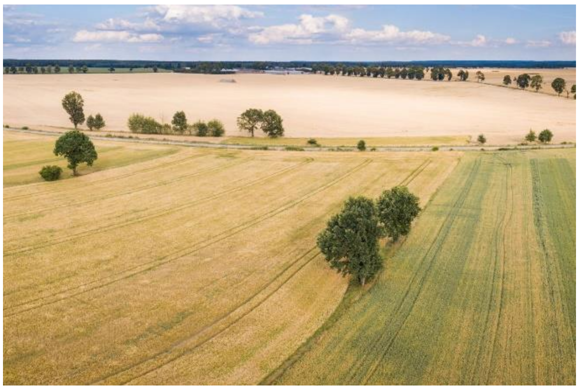
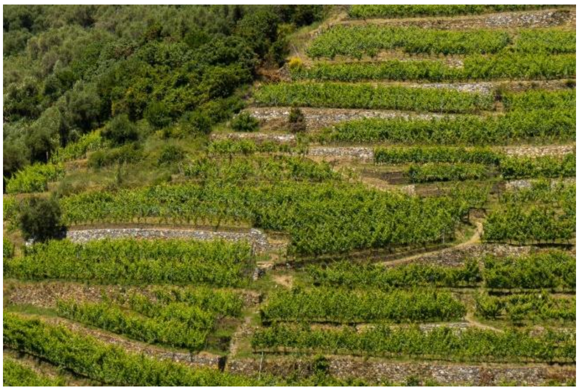


Credits: © Martin Grimm / Adobe Stock 307740656

Hedgerows



Credits: © allenpaul1000 / Adobe Stock 193427780

Isolated trees	Trees in group and field copses
 Credits: © milosz_g / Adobe Stock 233463882	 Credits: © darekb22 / Adobe Stock 204219760
Terraces	
 Credits: © Alberto Masnovo / Adobe Stock 287561080	 Credits: © Jose Tomas Abalos / Adobe Stock 277981724
 Credits: © Simon / Adobe Stock 234075189	

6. LINKS TO OTHER RELEVANT COMPLEMENTARY INFORMATION (*UNDER DEVELOPMENT*)

We include in this section the links to other complementary sources of information (not peer-reviewed meta-analyses or systematic reviews), provided by AGRI or other stakeholders

7. LIST OF SYNTHESIS PAPERS INCLUDED IN THE REVIEW OF THE FARMING PRACTICE IMPACTS

Ref. Num	Authors	Year	Title	Reference	DOI
1	Drexler, S; Gensior, A; Don, A	2021	Carbon sequestration in hedgerow biomass and soil in the temperate climate zone	REGIONAL ENVIRONMENTAL CHANGE, 21(3), 74.	10.1007/s10113-021-01798-8
2	Lowe, EB; Groves, R; Gratton, C	2021	Impacts of field-edge flower plantings on pollinator conservation and ecosystem service delivery - A meta-analysis	AGRICULTURE ECOSYSTEMS AND ENVIRONMENT, 310, 107290.	10.1016/j.agee.2020.107290
3	Shen, W; Li, S; Mi, M; Zhuang, Y; Zhang, L	2021	What makes ditches and ponds more efficient in nitrogen control?	AGRICULTURE, ECOSYSTEMS AND ENVIRONMENT, 314, 107409.	10.1016/j.agee.2021.107409
4	Abera, W; Tamene, L; Tibebe, D; Adimassu, Z; Kassa, H; Hailu, H; Mekonnen, K; Desta, G; Sommer, R; Verchot, L	2020	Characterizing and evaluating the impacts of national land restoration initiatives on ecosystem services in Ethiopia	LAND DEGRADATION AND DEVELOPMENT, 31(1), 37-52.	10.1002/ldr.3424
5	Albrecht, M; Kleijn, D; Williams, NM; Tschumi, M; Blaauw, BR; Bommarco, R; Campbell, AJ; Dainese, M; Drummond, FA; Entling, MH; Ganser, D	2020	The effectiveness of flower strips and hedgerows on pest control, pollination services and crop yield: a quantitative synthesis	ECOLOGY LETTERS, 23(10), 1488-1498.	10.1111/ele.13576
6	Carstensen, MV; Hashemi, F; Hoffmann, CC; Zak, D; Audet, J; Kronvang, B	2020	Efficiency of mitigation measures targeting nutrient losses from agricultural drainage systems: A review	AMBIO, 49, 1820-1837.	10.1007/s13280-020-01345-5
7	Chen, D; Wei, W; Chen, L	2020	How can terracing impact on soil moisture variation in China? A meta-analysis	AGRICULTURAL WATER MANAGEMENT, 227, 105849.	10.1016/j.agwat.2019.105849
8	England, JR; OGrady, AP; Fleming, A; Marais, Z; Mendham, D	2020	Trees on farms to support natural capital: An evidence-based review for grazed dairy systems	SCIENCE OF THE TOTAL ENVIRONMENT, 704, 135345.	10.1016/j.scitotenv.2019.135345
9	Paiola, A; Assandri, G; Brambilla, M; Zottini, M; Pedrini, P; Nascimbene, J	2020	Exploring the potential of vineyards for biodiversity conservation and delivery of biodiversity-mediated ecosystem services: A global-scale systematic review	SCIENCE OF THE TOTAL ENVIRONMENT, 706, 135839.	10.1016/j.scitotenv.2019.135839
10	Zamorano, J; Bartomeus, I; Grez, AA; Garibaldi, LA	2020	Field margin floral enhancements increase pollinator diversity at the field edge but show no consistent spillover into the crop field: a meta-analysis	INSECT CONSERVATION AND DIVERSITY, 13, 519-531.	10.1111/icad.12454
11	Zheng, YL; Wang, HY; Qin, QQ; Wang, YG	2020	Effect of plant hedgerows on agricultural non-point source pollution: a meta-analysis	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH, 27(20), 24831-24847.	10.1007/s11356-020-08988-7
12	Jia, L; Zhao, W; Fu, B; Daryanto, S; Wang, S; Liu, Y; Zhai, R	2019	Effects of minimum soil disturbance practices on controlling water erosion in China's slope farmland: A meta-analysis	LAND DEGRADATION AND DEVELOPMENT, 30(6), 706-716.	10.1002/ldr.3258
13	Marja, R; Kleijn, D; Tscharntke, T; Klein, AM; Frank, T; Batáry, P	2019	Effectiveness of agri-environmental management on pollinators is moderated more by ecological contrast than by landscape structure or land-use intensity	ECOLOGY LETTERS, 22, 1493-1500.	10.1111/ele.13339

Ref. Num	Authors	Year	Title	Reference	DOI
14	Valkama, E; Usva, K; Saarinen, M; Uusi-Kamppa, J	2019	A meta-analysis on nitrogen retention by buffer zones	JOURNAL OF ENVIRONMENTAL QUALITY, 48(2), 270-279.	10.2134/jeq2018.03.0120
15	Xiong, M; Sun, R; Chen, L	2018	Effects of soil conservation techniques on water erosion control: A global analysis	SCIENCE OF THE TOTAL ENVIRONMENT, 645, 753-760.	10.1016/j.scitotenv.2018.07.124
16	Chen, D; Wei, W; Chen, L	2017	Effects of terracing practices on water erosion control in China: A meta-analysis	EARTH-SCIENCE REVIEWS, 173, 109-121.	10.1016/j.earscirev.2017.08.007
17	Mandal, D; Srivastava, P; Giri, N; Kaushal, R; Cerda, A; Alam, NM	2017	Reversing land degradation through grasses: a systematic meta-analysis in the Indian tropics	SOLID EARTH, 8(1), 217-233.	10.5194/se-8-217-2017
18	Van Vooren, L; Reubens, B; Broekx, S; De Frenne, P; Nelissen, V; Pardon, P; Verheyen, K	2017	Ecosystem service delivery of agri-environment measures: A synthesis for hedgerows and grass strips on arable land	AGRICULTURE ECOSYSTEMS AND ENVIRONMENT, 244 32-51.	10.1016/j.agee.2017.04.015
19	Land, M; Graneli, W; Grimvall, A; Hoffmann, CC; Mitsch, WJ; Tonderski, KS; Verhoeven, JTA	2016	How effective are created or restored freshwater wetlands for nitrogen and phosphorus removal? A systematic review	ENVIRONMENTAL EVIDENCE, 5, 9.	10.1186/s13750-016-0060-0
20	Wei, W; Chen, D; Wang, LX; Daryanto, S; Chen, LD; Yu, Y; Lu, YL; Sun, G; Feng, TJ	2016	Global synthesis of the classifications, distributions, benefits and issues of terracing	EARTH-SCIENCE REVIEWS, 159, 388-403.	10.1016/j.earscirev.2016.06.010
21	Batáry, P; Dicks, LV; Kleijn, D; Sutherland, WJ	2015	The role of agri-environment schemes in conservation and environmental management	CONSERVATION BIOLOGY, 29(4), 1006-1016.	10.1111/cobi.12536
22	Dollinger, J; Dagès, C; Bailly, JS; Lagacherie, P; Voltz, M	2015	Managing ditches for agroecological engineering of landscape. A review	AGRONOMY FOR SUSTAINABLE DEVELOPMENT, 35, 999-1020.	10.1007/s13593-015-0301-6
23	Rivest, D; Paquette, A; Moreno, G; Messier, C	2013	A meta-analysis reveals mostly neutral influence of scattered trees on pasture yield along with some contrasted effects depending on functional groups and rainfall conditions	AGRICULTURE ECOSYSTEMS AND ENVIRONMENT, 165, 74-79.	10.1016/j.agee.2012.12.010
24	Scheper, J; Holzschuh, A; Kuussaari, M; Potts, SG; Rundlf, M; Smith, HG; Kleijn, D	2013	Environmental factors driving the effectiveness of European agri-environmental measures in mitigating pollinator loss – a meta-analysis	ECOLOGY LETTERS, 16(7), 912-20.	10.1111/ele.12128
25	Shackelford, G; Steward, PR; Benton, TG; Kunin, WE; Potts, SG; Biesmeijer, JC; Sait, SM	2013	Comparison of pollinators and natural enemies. A meta-analysis of landscape and local effects on abundance and richness in crops	BIOLOGICAL REVIEWS, 88(4), 1002-1021.	10.1111/brv.12040
26	Bayala, J; Sileshi, GW; Coe, R; Kalinganire, A; Tchoundjeu, Z; Sinclair, F; Garrity, D	2012	Cereal yield response to conservation agriculture practices in drylands of West Africa: A quantitative synthesis	JOURNAL OF ARID ENVIRONMENTS, 78, 13-25.	10.1016/j.jaridenv.2011.10.011
27	Maetens, W; Poesen, J; Vanmaerck, M	2012	How effective are soil conservation techniques in reducing plot runoff and	EARTH-SCIENCE REVIEWS, 115(1–2), 21-36.	10.1016/j.earscirev.2012.08.003

Ref. Num	Authors	Year	Title	Reference	DOI
			soil loss inEurope and the Mediterranean?		
28	Chaplin-Kramer, R; O'Rourke, ME; Blitzer, EJ; Kremen, C	2011	A meta-analysis of crop pest and natural enemy response to landscape complexity	ECOLOGY LETTERS, 14(9), 922-932.	10.1111/j.1461-0248.2011.01642.x
29	Haaland, C; Naisbit, RE; Bersier, LF	2011	Sown wildflower strips for insect conservation: A review	INSECT CONSERVATION AND DIVERSITY, 4, 60–80.	10.1111/j.1752-4598.2010.00098.x
30	Stehle, S; Elsaesser, D; Gregoire, C; Imfeld, G; Niehaus, E; Passeport, E; Payraudeau, S; Schafer, RB; Tournebize, J; Schulz, R	2011	Pesticide risk mitigation by vegetated treatment systems: A meta-analysis	JOURNAL OF ENVIRONMENTAL QUALITY, 40(4), 1068-1080.	10.2134/jeq2010.0510
31	Zhang, XY; Liu, XM; Zhang, MH; Dahlgren, RA; Eitzel, M	2010	Review of vegetated buffers and a meta-analysis of their mitigation efficacy in reducing nonpoint source pollution	JOURNAL OF ENVIRONMENTAL QUALITY, 39, 76-84.	10.2134/jeq2008.0496
32	Liu, XM; Mang, XY; Zhang, MH	2008	Major factors influencing the efficacy of vegetated buffers on sediment trapping: A review and analysis	JOURNAL OF ENVIRONMENTAL QUALITY, 37(5), 1667-1674.	10.2134/jeq2007.0437
33	Mayer, PM; Reynolds, SK; McCutchen, MD; Canfield, TJ	2007	Meta-analysis of nitrogen removal in riparian buffers	JOURNAL OF ENVIRONMENTAL QUALITY, 36, 1172-1180.	10.2134/jeq2006.0462
34	Dorioz, JM; Wang, D; Poulenard, J; Trévisan, D	2006	The effect of grass buffer strips on phosphorus dynamics — a critical review and synthesis as a basis for application in agricultural landscapes in France	AGRICULTURE, ECOSYSTEMS AND ENVIRONMENT, 117(1), 4-21.	10.1016/j.agee.2006.03.029