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Water, Food, Energy, and Ecosystems (WFEE) nexus in the Pan-Third Pole: research progress and perspectives in achieving SDGs

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Abstract

This paper describes the use of the LaTeX 2$_\varepsilon$ sagej.cls class file for setting papers to be submitted to a *SAGE Publications* journal. The template can be downloaded here.

Keywords

Nexus, SDGs, Water, Food, Energy, Ecosystems, Pan-Third Pole

Introduction

Climate change has brought more uncertainty to the socio-economic development of ecologically fragile regions and developing countries (Rasul and Sharma 2016; Pritchard 2019). These regions face risks to freshwater shortages, food security and energy depletion (Bazilian et al. 2011; Gain et al. 2016; Viviroli et al. 2020). The sustainable development goals (SDGs) need to pay particular attention to these regions (Pradhan et al. 2017). The water-food-energy-ecosystem (WFEE) nexus driven by climate change and land-use change, involving SDG6 (Clean water anf sanitation), SDG2 (Zero hunger), SDG7 (Affordable and clean energy), and SDG15 (Life on Land), etc (Fu 2020; Peng et al. 2020). These SDGs are most closely related to the achievement of sustainable development (Schroeder et al. 2019). WFEE has complex connections within the region. For example, the acquisition of food and the production of energy both consume large amounts of water, and these processes are carried by ecosystems (Fu et al. 2019). The trade-off between water use for food and energy production becomes a key issue for regional sustainable development (Liu et al. 2018). Therefore, a deeper understanding of the WFEE nexus requires an enhanced integrated understanding of Social-ecological processes at the regional scale (McElwee et al. 2020).

The pan-third pole, as the major part of ecologically fragile regions and developing countries in Eurasia, extends from the third pole to the west and north, covering the Eurasian highlands of the Tibetan plateau, The Pamir, the Hindu Kush, the Iranian plateau, the Caucasus, the Carpathian and other mountains and their hydrologic processes, also overlapping with China's Belt and Road region (Yao et al. 2017). The optimization of WFEE nexus in the pan-Third Pole region is both a crucial issue for the Eurasian ecologically fragile region and developing countries to promote SDGs, as well as an essential impetus for China's Belt and Road Program (Yao 2018).

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The major WFEE complex issues in the pan-Third Pole region are closely linked to regional socio-ecological processes. For example, climate change affects local eco-hydrological processes (Pritchard 2019), so that water security and food availability in the mountains are critical (Viviroli et al. 2020). Dams built for irrigation and power generation can bring economic benefits, but also can lead to significant environmental and social costs (Ziv et al. 2012; Zeng et al. 2017). The pan-Third Pole region has many typical international rivers. It is clear that several countries have conflicting interests in the management of water resources in international rivers (D'Odorico et al. 2018). The prevalence of global trade complicates food security and environmental externalities in food-exporting countries (Grafton et al. 2017), and may even jeopardize rural livelihoods and trigger social inequities (Dell'Angelo et al. 2017). However, most studies focus on only one social or ecological process . It is not sufficient to support SDGs that are linked between indicators.

Based on the Classification – coordination – collaboration paradigm of SDGs, we attempts to provide a research overview from the geographical process of classification (Fu et al. 2020). At the same time, we proposes a research outlook for SDGs integration and cross-regional collaboration. This will strengthen the systematic geographical understanding of pan-Third Pole WFEE and scientifically support the accelerated realization of SDGs.

Relationship between WFEE and SDGs in the Pan-Third Pole

Research progress and gaps of WFEE in the Pan-Third Pole

Climate change and ecohydrological processes

Climate change and agricultural and livestock production

Environmental change and clean energy

Local social adaptation to environmental change

Perspectives in achieving SDGs in the Pan-Third Pole through WFEE

Geographic data scale matching and model parameter localization are research cornerstones for an integrated understanding of SDG relationships

Accurate assessment of ecosystem services is the link between the physical processes of WFEE and the needs of SDG society.

Social-Ecological System Resilience Enhancement under Environmental Change is a Scientific Explanation of the SDG Path to Achievement

Cooperation in watershed water management and transnational trade cooperation as a collaborative shortcut to a regional SDG

Conclusion

Declaration of conflicting interests

The author(s) declared there were no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Many authors submitting to research journals use LaTeX 2$_\varepsilon$ to prepare their papers. This paper describes the sagej.cls class file which can be used to convert articles produced with other LaTeX 2$_\varepsilon$ class files into the correct form for submission to *SAGE Publications*.

The sagej.cls class file preserves much of the standard LaTeX 2$_\varepsilon$ interface so that any document which was produced using the standard LaTeX 2$_\varepsilon$ article style can easily be converted to work with the sagej style. However, the width of text and typesize will vary from that of article.cls; therefore, *line breaks will change* and it is likely that displayed mathematics and tabular material will need re-setting.

In the following sections we describe how to lay out your code to use sagej.cls to reproduce much of the typographical look of the *SAGE* journal that you wish to submit to. However, this paper is not a guide to using LaTeX 2$_\varepsilon$ and we would refer you to any of the many books available

The three golden rules

Before we proceed, we would like to stress *three golden rules* that need to be followed to enable the most efficient use of your code at the typesetting stage:

(i) keep your own macros to an absolute minimum;

(ii) as TeX is designed to make sensible spacing decisions by itself, do *not* use explicit horizontal or vertical spacing commands, except in a few accepted (mostly mathematical) situations, such as `\,` before a differential d, or `\quad` to separate an equation from its qualifier;

(iii) follow the journal reference style.

Getting started

The sagej class file should run on any standard LaTeX 2$_\varepsilon$ installation. If any of the fonts, style files or packages it requires are missing from your installation, they can be found on the *TeX Collection* DVDs or downloaded from CTAN.

The article header information

The heading for any file using sagej.cls is shown in Figure 1. You must select options for the trim/text area and the reference style of the journal you are submitting to. The choice of `options` are listed in Table 1.

表 1. The choice of options.

Option	Trim and font size	Columns
`shortAfour`	210 × 280 mm, 10pt	Double column
`Afour`	210 × 297 mm, 10pt	Double column
`MCfour`	189 × 246 mm, 10pt	Double column
`PCfour`	170 × 242 mm, 10pt	Double column
`Royal`	156 × 234 mm, 10pt	Single column
`Crown`	7.25 × 9.5 in, 10pt	Single column
`Review`	156 × 234 mm, 12pt	Single column

Option	Reference style
`sageh`	SAGE Harvard style (author-year)
`sagev`	SAGE Vancouver style (superscript numbers)
`sageapa`	APA style (author-year)

For example, if your journal is short A4 sized, uses Times fonts and has Harvard style references then you would need

```
\documentclass[ShortAfour,times,sageh]{sagej}
```

Most *SAGE* journals are published using Times fonts but if for any reason you have a problem using Times you can easily resort to Computer Modern fonts by removing the `times` option.

'Review' option

Some journals (for example, *Journal of the Society for Clinical Trials*) require that papers are set single column and with a larger font size to help with the review process. If this is a requirement for the journal that you are submitting to, just add the `Review` option to the `\documenclass[]{sagej}` line.

Remarks

(i) In `\runninghead` use '*et al.*' if there are three or more authors.

(ii) For multiple author papers please note the use of `\affilnum` to link names and affiliations. The corresponding author details need to be included using the `\corrauth` and `\email` commands.

(iii) For submitting a double-spaced manuscript, add `doublespace` as an option to the documentclass line.

(iv) The abstract should be capable of standing by itself, in the absence of the body of the article

```
\documentclass[<options>]{sagej}

\begin{document}

\runninghead{<Author surnames>}

\title{<Initial capital only>}

\author{<An Author\affilnum{1},
Someone Else\affilnum{2} and
Perhaps Another\affilnum{1}>}

\affiliation{<\affilnum{1}First and third authors' affiliation\\
\affilnum{2}Second author affiliation>}

\corrauth{<Corresponding author's name and full postal address>}

\email{<Corresponding author's email address>}

\begin{abstract}
<Text>
\end{abstract}

\keywords{<List keywords>}

\maketitle

\section{Introduction}
.
.
.
```

图 1. Example header text.

and of the bibliography. Therefore, it must not contain any reference citations.

(v) Keywords are separated by commas.

(vi) If you are submitting to a *SAGE* journal that requires numbered sections (for example, IJRR), please add the command `\setcounter{secnumdepth}{3}` just above the `\begin{document}` line.

The body of the article

Mathematics

sagej.cls makes the full functionality of $\mathcal{AMS}$TEX available. We encourage the use of the `align`, `gather` and `multline` environments for displayed mathematics. amsthm is used for setting theorem-like and proof environments. The usual `\newtheorem` command needs to be used to set up the environments for your particular document.

```
\begin{table}
\small\sf\centering
\caption{<Table caption.>}
\begin{tabular}{<table alignment>}
\toprule
<column headings>\\
\midrule
<table entries
(separated by & as usual)>\\
<table entries>\\
.
.
.\\
\bottomrule
\end{tabular}
\end{table}
```

图 2. Example table layout.

Figures and tables

sagej.cls includes the graphicx package for handling figures.

Figures are called in as follows:

```
\begin{figure}
\centering
\includegraphics{<figure name>}
\caption{<Figure caption>}
\end{figure}
```

For further details on how to size figures, etc., with the graphicx package see, for example, Kopka and Daly (2003) or Mittelbach and Goossens (2004).

The standard coding for a table is shown in Figure 2.

Cross-referencing

The use of the LaTeX cross-reference system for figures, tables, equations, etc., is encouraged (using `\ref{<name>}` and `\label{<name>}`).

End of paper special sections

Depending on the requirements of the journal that you are submitting to, there are macros defined to typeset various special sections.

The commands available are:

```
\begin{acks}
To typeset an
  "Acknowledgements" section.
\end{acks}

\begin{biog}
To typeset an
  "Author biography" section.
\end{biog}

\begin{biogs}
To typeset an
  "Author Biographies" section.
\end{biogs}

\begin{dci}
To typeset a "Declaration of
  conflicting interests" section.
\end{dci}

\begin{funding}
To typeset a "Funding" section.
\end{funding}

\begin{sm}
To typeset a
  "Supplemental material" section.
\end{sm}
```

Endnotes

Most *SAGE* journals use endnotes rather than footnotes, so any notes should be coded as `\endnote{<Text>}`. Place the command `\theendnotes` just above the Reference section to typeset the endnotes.

To avoid any confusion for papers that use Vancouver style references, footnotes/endnotes should be edited into the text.

References

Please note that the files SageH.bst and SageV.bst are included with the class file for those authors using BibTeX. The files work in a completely standard way, and you just need to uncomment one of the lines in the below example depending on what style you require:

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and remember to add the relevant option to the `\documentclass[]{sagej}` line as listed in Table 1.

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Website: http://www.sunrise-setting.co.uk

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