**Assessing the Global Decline in Groundwater Levels**

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The entire world is seeing a serious loss of groundwater resources due to rising populations, intensive agricultural practices, and the universal effects of climate change. This study examines the complex network of variables causing the worldwide fall in groundwater levels, examining the effects and suggesting possible alternatives. The research reveals the vast network of causes behind the declining groundwater reserves by examining the intricate processes of excessive taking for domestic, industrial, and agricultural uses as well as changing precipitation patterns and land-use practices.

The research suggests a variety of prevention and adaptation options in response to this serious issue. The article offers a wide range of recommendations, from creative recharge techniques to sustainable groundwater management strategies. With a focus on the critical role that educated policymaking and public awareness play, the research supports an effective plan to protect this valuable freshwater resource. Built by a strong research approach that includes modeling, data analysis, and in-depth case studies, this work adds crucial context to the understanding of the global groundwater situation. This research provides useful answers for the preservation and appropriate use of this priceless natural resource to communities, water managers, and policymakers as they battle with the challenge of conserving groundwater resources.

**CCS CONCEPTS •** Insert your first CCS term here • Insert your second CCS term here • Insert your third CCS term here

**Keywords :** Groundwater reservoirs, Depletion, Climate change, Agriculture, Rapid development, Freshwater demand, Water security, Ecosystem resilience, Unsustainable extraction, Precipitation patterns, Land-use practices, Data analysis, Modeling, Case study exams, Global emergency, Ripple effects, Water quality degradation, Land subsidence, Ecological ramifications, Social implications, Mitigation strategies, Adaptation options, Sustainable water supply, Worldwide groundwater dilemma, Legislative action, Scholarly conversation, Practical remedies, Roadmap

**ACM Reference Format:**

First Author’s Name, Initials, and Last Name, Second Author’s Name, Initials, and Last Name, and Third Author’s Name, Initials, and Last Name. 2018. The Title of the Paper: ACM Conference Proceedings Manuscript Submission Template: This is the subtitle of the paper, this document both explains and embodies the submission format for authors using Word. In Woodstock ’18: ACM Symposium on Neural Gaze Detection, June 03–05, 2018, Woodstock, NY. ACM, New York, NY, USA, 10 pages. NOTE: This block will be automatically generated when manuscripts are processed after acceptance.

**Introduction :**

The worldwide community is increasingly concerned about the depletion of groundwater reservoirs due to the growing effects of climate change, expanding agricultural, and rapid development, which are all contributing to the world's rising demand for freshwater. Groundwater is essential for home requirements, business, and agriculture. It is the foundation of a sustainable water supply. On the other hand, water security and ecosystem resilience are seriously threatened by the increasing rate at which groundwater levels are declining.

This study attempts to explore the various aspects of the declining groundwater levels in an effort to decipher the complex interactions among the variables that are causing this worldwide emergency. The complexities underlying this topic warrant serious consideration, ranging from the unsustainable extraction of groundwater for varied purposes to the profound implications of precipitation patterns altering due to climate change and shifting land-use practices.

This study applies a strong technique that incorporates data analysis, modeling, and case study exams to aim to fully comprehend the causes and effects of the diminishing groundwater levels. This study is to highlight the necessity of taking appropriate action and managing groundwater resources responsibly by highlighting the seriousness of the issue.

Throughout this investigation, we will examine the ripple effects of declining groundwater, ranging from water quality degradation and land subsidence to extensive ecological and social ramifications. Furthermore, we hope to provide a nuanced knowledge of the unique difficulties faced by communities dealing with declining groundwater resources by presenting case studies from various geographies.

**Literature Review:**

With the increasing effects of expanding agricultural, growing urbanization, and the complex effects of climate change, the depletion of groundwater reserves has become an urgent global concern. A thorough analysis of the body of research on the subject of understanding the causes, effects, and potential mitigating techniques related to diminishing groundwater levels has been conducted.

1. Changes in Hydrology and Climate:

A multitude of studies demonstrate the complex interplay between groundwater dynamics and climate change. Fluctuations in groundwater recharge rates are largely caused by changes in temperature, precipitation patterns, and hydrological cycles. The necessity for a comprehensive understanding of how these climate fluctuations affect local groundwater supplies is highlighted by research.

2. Unsustainable Extraction Practices:

One of the key topics in the literature is the unsustainable extraction of groundwater for a variety of uses, such as industrial activities and agricultural irrigation. In order to prevent over-extraction and guarantee the long-term sustainability of groundwater supplies, academics stress the significance of putting sustainable water management techniques into practice.

3. Implications for Water Security:

Declining groundwater levels have a direct impact on water security, an essential component of sustainable development. Academics investigate the effects on communities, especially in semi-arid and dry locations where groundwater is frequently the main source of water. The body of research emphasizes the necessity of comprehensive strategies to improve water security in the face of diminishing groundwater supplies.

4. Ecological and Societal Consequences:

It is commonly known that decreasing groundwater levels have significant ecological and socioeconomic effects. Important areas of focus include harmful effects on ecosystems, deteriorated water quality, and land subsidence. Case studies from various geographic locations shed light on the particular difficulties that ecosystems and populations encounter in adjusting to the depletion of groundwater supplies.

5. technical and Policy Interventions:

In order to effectively solve the groundwater situation, literature underlines the significance of integrating technical advancements with policy interventions. In order to lessen the effects of falling groundwater levels, academics support a comprehensive and multidisciplinary approach that includes everything from sophisticated groundwater modeling tools to legislative frameworks encouraging sustainable water use.

6. Community Engagement and Awareness: The importance of community engagement and awareness in sustainable groundwater management is a recurring issue in the literature. Academics emphasize that in order to promote responsible water usage and conservation, community-driven solutions, participatory approaches, and educational activities are essential.

7. Future Research Directions: Although the body of current literature offers insightful information, there are still unanswered questions. In the future, research will focus on creating novel technologies for groundwater recharge, examining the long-term effects of climate change on groundwater resources, and evaluating the efficacy of policy interventions in various socioeconomic circumstances.

In conclusion, the study of the literature emphasizes how urgent it is to address the worldwide groundwater situation using a multifaceted, cooperative strategy. This review adds to the ongoing conversation about protecting this priceless freshwater resource by summarizing the body of information and suggesting areas for further research.

* 1. **Accessibility**

Following the guidelines throughout this template will also improve the accessibility of your manuscript and increase the audience for your work. Ensure that heading styles are applied as instructed, tables are created using Word’s table feature (rather than an image), figures have a text equivalent, and list styles are applied as instructed.

To increase the accessibility of your manuscript, you should set the title and language metadata. On Word for Windows, open the File tab and click on Info. On Word for Mac, click the File Menu and select Properties, then click the Summary tab. Fill in the title of your document. For anonymous review, clear the ‘author’ field.

To set the document language, click the Review tab in the Ribbon. On Word for Windows: Click the Language button and select “Set Proofing Language.” Verify the language is set correctly. On Word for Mac: Click the Language button and select the document language from the pop-up.

* 1. **More about the submission template**

Thissubmission version of your paper should not have headers or footers, these will be added when your manuscript is processed after acceptance. It should remain in a one-column format—please do not alter any of the styles or margins.

*If a paper is accepted for publication*, authors will be instructed on the next steps. Authors must then follow the submission instructions found on their respective publication’s web page. Once your submission is received, your paper will be processed to produce the formatted Word, PDF, and HTML5 output formats, which will be provided to you for review, revision/resubmission (if applicable), and approval.

* 1. **Inserting CCS concepts**

The new template enables you to import required indexing concepts for your article from the [ACM Computing Classification System (CCS)](http://www.acm.org/publications/class-2012) using an [indexing support tool](http://dl.acm.org/ccs/ccs.cfm?) found in the ACM Digital Library (DL). The tool generates formatted text after you have selected your terms. To insert CCS terms into your document, copy and paste the formatted text from the CCS tool using the “<https://dl.acm.org/ccs/ccs.cfm>” link into the “CCS CONCEPTS” section.

An additional step is necessary to ensure that the proper CCS terms are added to the Digital Library citation page: from the “view CCS TeX Code” listing, click on “Show the XML Only.” Highlight and copy the XML code from the window. You must insert the XML code into your Word document’s properties: from your Word document, click on “**File**”, then click on the “**Info**” tab on the left-hand side panel, then click “**Properties**” and select “**Show All Properties.**” Click within the “Comments” metadata field and paste the XML data.

1. **Inserting Content Elements**

The next subsections provide instructions on how to insert figures, tables, and equations in your document.

* 1. **Tables**

Tables are “float elements” which should be inserted after their first text reference and have specific styles for identification. Do not use images to present tables, or they will be inaccessible to readers using assistive technologies.

Authors can insert tables by using the MS Word option (INSERT ->Table) and providing the required row and column size. Every table must have a caption (title) above it, which must have the **“TableCaption**” style applied. Please note that tables **should not** be supplied as image files, but if they are images they must have the “Image” style applied. As an example, Table 1 shows all the styles available in this template, to be applied to the respective element of your text.

Table 1: Styles available in the Word template

| Style Tag | Definition | Style Tag | Definition |
| --- | --- | --- | --- |
| Title\_document | main title of article | ListParagraph | list items |
| Subtitle | subtitle of article | Statements | math statements |
| Authors | author name | Extract | block quotations |
| Affiliation | author affiliation information | Algorithm Caption | caption for algorithm |
| AuthNotes | footnote to author(s) | AckHead | heading for acknowledgements |
| Abstract | abstract text | AckPara | acknowledgements text |
| CCSHead | heading for CSS Concepts | GrantSponsor | sponsor of grant |
| CCSDescription | CSS terms | GrantNumber | number for the grant |
| KeyWordHead | heading for keywords | ReferenceHead | heading for references |
| Keywords | keywords text | Bib\_entry | references |
| ORCID | author's ORCHID # | AppendixH1 | appendix heading level 1 |
| Head1 | heading level 1 | AppendixH2 | appendix heading level 2 |
| Head2 | heading level 2 | AppendixH3 | appendix heading level 3 |
| Head3 | heading level 3 | TableCaption | title of table |
| PostHeadPara | first paragraph after a heading | TableHead  TableFootnote | column head of table  footnote to table |
| Para | Subsequent paragraphs of general text | Image | figures |
| ParaContinue  DisplayFormula | flush left text after display items like math equations, lists etc.  numbered math equation | DOI | Digital object identifier |
| DisplayFormulaUnnum | unnumbered equations | Label | labela |
| ComputerCode | Display Computer codes | In-text code | intext computer code |
| Short Title | Short title of article | History | Dates of article |

a This is example of table footnote.

Tables can be very difficult for people using screen reader technology to understand unless they include markup that explicitly defines the relationships between all the parts (i.e.: headers and data cells). *A key to making data tables accessible to screen reader users is to clearly identify column and row headers.* In Word, authors should identify which row or rows contain column headers. Below are the steps to do this:

1. Select that table’s row, then right-click the row and select “Table Properties”;
2. In the *Table Properties* window, click the *Row* tab and select the box that says “Repeat as header row at the top of each page.”

Or

Apply the “table head” style by highlighting the respective row and applying the “**TableHead**” style found in the “Body Element” section of the ACM Master Article Template.

* 1. **Figures**

Figures are “float elements” which should be inserted after their first text reference, and have specific styles for identification. Insert a figure and apply the “**Image**” paragraph style to it. For the figure caption, apply the style “**FigureCaption.**”

To accommodate readers with color vision differences, figures should still be usable when printed in grayscale. Refer to elements of the figure with non-color terms, for example “indicated as squares” instead of “indicated in blue”. Use different patterns in bar charts, different line patterns in graphs, and different shapes in plots to distinguish groups of elements and reinforce color differences.

* + 1. *Half Width Figures.*

Figure 1 is an example of a figure and caption spanning the half-page width (one column in a two column format) with the styles applied. If your figure contains third-party material, you must clearly identify it as such, as shown in the example below.



Figure 1: 1907 Franklin Model D roadster. Photograph by Harris & Ewing, Inc. [Public domain], via Wikimedia Commons. (https://goo.gl/VLCRBB)

* + 1. *Full Width Figures.*

Figure 2 is an example of a figure and caption spanning the full-page width with the styles applied. If your figure contains third-party material, you must clearly identify it as such, as shown in the examples.

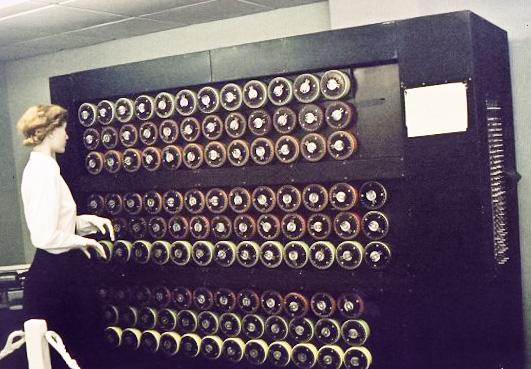


Figure 2: Mockup of a bombe machine at Bletchley Part. Photograph by Sarah Hartwell. [Public domain], via Wikimedia Commons. (<https://commons.wikimedia.org/wiki/File:TuringBombeBletchleyPark.jpg>)

* + 1. *Multi-part figure.*

Authors can also insert a multi-part figure above a single caption. Every inserted figure must have the “Image” style applied. Below are instructions regarding how to insert a multi-part figure in your paper.

* If the author wants to insert two multi-part images, they must draw a one row and one column table and insert the images one-by-one in the cells.
* If the author wants to insert three multi-part images, they must draw a one-row and three-column table and insert the images one by one in all three cells.
* If the author wants to insert four multi-part images, they must draw a two-row and two-column table and insert the images one-by-one in all four cells. (see the following example):

| Figure 2: The layout of multipart images should be as per the above example within the table in image 1. | Figure 2: The layout of multipart images should be as per the above example within the table in image 2. |
| --- | --- |
| Figure 2: The layout of multipart images should be as per the above example within the table in image 3. | Figure 2: The layout of multipart images should be as per the above example within the table in image 4. |

Figure 3: The layout of multipart images should be as per the above example within the table. All images must have the “Image” style applied.

* + 1. *Figure Descriptions.*

Every figure should have a figure description unless it is purely decorative. These descriptions convey what’s in the image to someone who cannot see it. They are also used by search engine crawlers for indexing images, and when images cannot be loaded.

A figure description must be unformatted plain text less than xxx characters long. Figure descriptions should not repeat the figure caption – their purpose is to capture important information that is not already provided in the caption or the main text of the paper. For figures that convey important and complex new information, a short plain text description may not be adequate. More complex alternative descriptions can be placed in an appendix and referenced in a short figure description. For example, provide a data table capturing the information in a bar chart, or a structured list representing a graph. For additional information regarding how best to write figure descriptions and why doing this is so important, please see [https://www.acm.org/accessibility.](https://www.acm.org/accessibility)

The instructions below describe the required steps authors need to follow in order to insert descriptive text for figures (alt-txt value) in **MS Word 2019 on Windows or Word 2016 and later on Mac**:

1. Insert a picture in the document.
2. Right-click the image and select “Edit Alt Text”.
3. In the “alt text” section, provide your text description of the image.

Below are the steps to insert figure descriptions in **MS Word 2013 and 2016**:

1. Insert a picture in the document.
2. Right click on the inserted picture and select the **Format Picture** option.
3. In the settings at the right side of the window, click on the “Layout & Properties” icon (3rd option).
4. Expand **Alt Txt** option.
5. In the “Title” and “Description” text boxes, type the text you want to represent the figure, and then click “Close.”

Below are steps to insert the alt-txt value in **MS Word 2010/2011 for Windows\***:

1. Insert a picture in the document.
2. Right click on the inserted picture and select the **Format Picture** option.
3. Select the **Alt Txt** option from the left-side panel options.
4. In the “Title” and “Description” text boxes, type the text you want to represent the picture, and then click “Close.”  
   \* The Mac 2011 version 14.0.0 and later allows the option for inserting “alt-text.” In the MAC version of Word 2016, right-click on the image and select “Edit Alt Text” from the pop-up menu and then enter the description for the alt text.
   1. **Quotations and Extracts**

There are styles for block quotations, which should be used for quotes that are separated from in-line text. Below is an example.

“Microsoft tried to revive the idea of an assistant with Clippy, who began popping up in Microsoft Office in 1997. Its creator, Kevan Atteberry, was actually contracted by Microsoft to design Clippy, which, funnily enough, he did on a Mac … Sure, people could disable Clippy, but the fact he was on by default angered people.” [10]

* 1. **Equations**

There are two types of math equations: the *numbered display math equation* and the *un-numbered display math equation*. Below are examples of both.

* + 1. ***DisplayFormula.***

*The* ***DisplayFormula*** *style is applied in the numbered math equation. A numbered display equation always has an equation number (label) on the right.*

(1)

* + 1. *DisplayFormula.Unnum****.***

*The* ***DisplayFormulaUnnum*** *style is applied only in unnumbered equations. An unnumbered display equation never contains an equation number Bertot and Grimes (2012) on the right—this element distinguishes it from the numbered equation.*

*Please note: the subsequent text after the* ***DisplayFormula*** *(numbered equation) or* ***DisplayFormulaUnnum*** *(unnumbered equation) must have the paragraph style* ***ParaContinue*** *applied.*

* 1. **Math statements**

Math statements should have the “Statement” style applied.

***Theorem/Proof/Lemma.*** *Math statements should have the “****Statement****” style applied. This paragraph is an example of the “****Statement****” style.*

* 1. **Algorithms**

Algorithms use the styles “AlgorithmCaption” and “Algorithm”.

ALGORITHM 1: Iterative Algorithm

current\_position center

current\_direction up

current\_position is inside circle

while current\_position is inside circle, do

neighborhood all grid hexes within two hexes from current\_position

for each hex in neighborhood, do

for each neuron in hex do

convert neuron\_orientation to vector.

scale vector by neuron\_excitation

vector\_sum vector\_sum + vector

end

end

normalize vector\_sum

end

1. **COMPUTER CODE**

Display Computer codes can be inserted using “ComputerCode” style.

CHAT Start

SAY Welcome to my world

WAIT 1.2

SAY Thanks for Visiting

ASK Do you want to play a game?

OPT Sure

OPT No Thanks

Similary, this is an example of intext code text.

Similary, this is an example of intext code text.

1. **Citing Related Work**

This section cites a variety of journal [5, 15], conference [1, 6, 8, 12, 13], and magazine [3] articles to illustrate how they appear in the references section. It also cites books [9, 10], a technical report [7], a PhD dissertation [4], an online reference [14], a software artifact [11], and a dataset [2].

As you build your article, you should note where you will be placing citations. If you are using numbered citations and references, the reference number - "...as shown in [5]..." is sufficient. If you are using the "author year" style, a reasonable placeholder is the primary author's last name and the year of publication - "...as shown in [Harel 1978]..." - we will be updating this placeholder later in the process with the citation label as generated by the Word macros in the "master template.

**ACKNOWLEDGMENTS**

Acknowledgments are placed before the references. Add information about grants, awards, or other types of funding that you have received to support your research. Author can capture the **grant sponsor information**, by selecting the grant sponsor text and apply style ‘GrantSponsor’. After this, select grant no and apply ‘GrantNumber’ from style panel. Example of Grant sponsor: Competitive Research Programme and example of Grant no: CRP 10-2012-03.

1. **HISTORY DATES**

In case of submissions being prepared for Journals or PACMs, please add history dates after References as (*please note revised date is optional*):

Received November 2019; revised August 2020; accepted December 2020

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**A  APPENDICES**

In the appendix section, three levels of Appendix headings are available.

**A.1 General Guidelines (AppendixH2)**

1. Save as you go and backup your file regularly.
2. Do not work on files that are saved in a cloud directory. To avoid problems such as MS Word crashing, please only work on files that are saved locally on your machine.
3. Equations should be created with the built-in Microsoft® Equation Editor included with your version of Word. (Please check the compatibility at <http://tinyurl.com/lzny753> for using MathType.)
4. Please save all files in DOCX format, as the DOC format is only supported for the Mac 2011 version.
5. Tables should be created with Word’s “Insert Table” tool and placed within your document. (Tables created with spaces or tabs will have problems being properly typeset. To ensure your table is published correctly, Word’s table tool must be used.)
6. Do not copy-and-paste elements into the submission document from Excel such as charts and tables.
7. Footnotes should be inserted using Word’s “Insert Footnote” feature.
8. Do not use Word’s “Insert Shape” function to create diagrams, etc.
9. Do not have references appear in a table/cells format as it will produce an error during the layout generation process.
10. MS Word does not consistently allow the original formatting to be modified in the text. In these cases, it is best to copy all the document’s text from the specific file and paste into a new MS Word document and then save it.
11. At times there are font problems such as “odd” stuff/junk characters that appear in the text, usually in the references. This can be caused by a variety of reasons such as copying-and-pasting from another file, file transfers, etc. Please review your text prior to submission to make sure it reads correctly.

*A.1.1 Preparing Graphics (AppendixH3)*

1. Accepted image file formats: TIFF (.tif), JPEG (.jpg).
2. Scalable vector formats (i.e., SVG, EPS and PS) are greatly preferred.
3. Application files (e.g., Corel Draw, MS Word, MS Excel, PPT, etc.) are NOT recommended.
4. Images created in Microsoft Word using text-box, shapes, clip-art are NOT recommended.
5. IMPORTANT: All fonts must be embedded in your figure files.
6. Set the correct orientation for each graphics file.

**A.2 Placeholder Text**

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