Response to Editor:

1. I did not think the authors take paper publication as a serious academic activity. All figures need good quality, and proper font size to be recognized. Also the references should fit HESS's format.

Respond: Thank you for your suggestions. We have checked all figures, ensuring that their resolution is above 600 dpi and that the information is identifiable. At the same time, we have modified the reference format to ensure compliance with HESS requirements, and the revised content has been added to the new manuscript and marked in blue.

2.The serious problem of current paper is the lack of in-situ validation. The authors claim that "the severity of salinization has been increasing", however, I did not see the validation of the remote sensing results. Without validation, it does not warrant a scientific paper.

Respond:

(1) Cross-validation of remote sensing data

We used the HWSD 2.0 data released by the Food and Agriculture Organization (FAO) and extracted the relevant data for our research area. Based on the salt-alkali patches currently identified by remote sensing, we selected 92 verification points and extracted their corresponding soil information. After verification, we found that among these 92 verification points, 75 points were consistent with the interpretation results, resulting in an overall accuracy of 81.52%, comparison points distribution is shown in Figure R1.

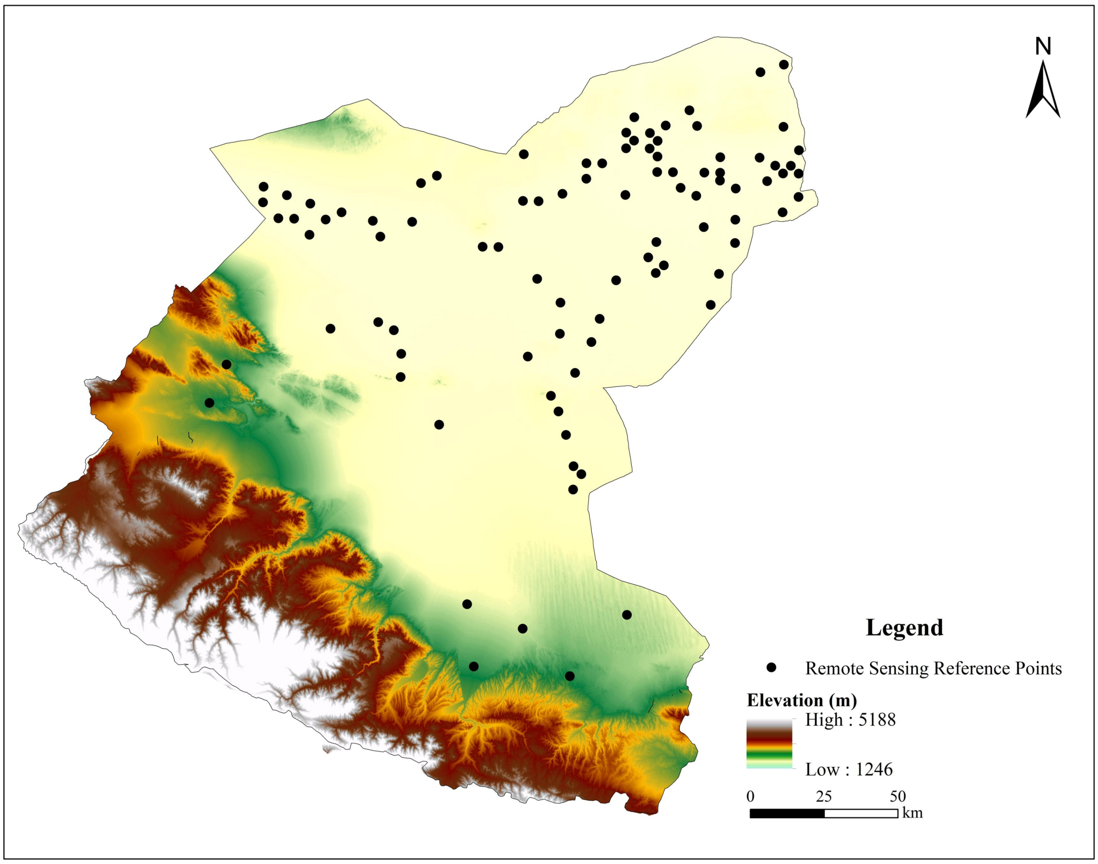

Figure R1. Distribution of Remote Sensing Reference Points

(2) Watershed soil data analysis and verification

Based on the observation results from the Comprehensive Ecological Environment Observation Station of Shiyang River Basin at Northwest Normal University, we selected 11 soil sampling sites within the Shiyang River Basin during the period of 2019-2024. Through systematic field investigation and sampling, we measured the electrical conductivity and pH values of soil samples in the laboratory. The spatial distribution of sampling points and dataset validation points is illustrated in Figure R2, with the measured electrical conductivity and pH values meticulously recorded in Table R1. The measured electrical conductivity and pH values serve as ground truth data, forming a mutual verification relationship with remote sensing interpretation data. From the data, it can be observed that the electrical conductivity is high (13.65-15.67 dS/m) in the wetland areas around Qingtu Lake and Hongyashan Reservoir in the northern part of the Shiyang River Basin, while it is generally low (1.20-2.02 dS/m) in the upstream areas at higher elevations. This spatial variation pattern is highly consistent with the salt characteristic features identified from the corresponding remote sensing image patches. The pH value ranges from 8.30 to 8.51, and its variation trend is consistent with the salt content variation.

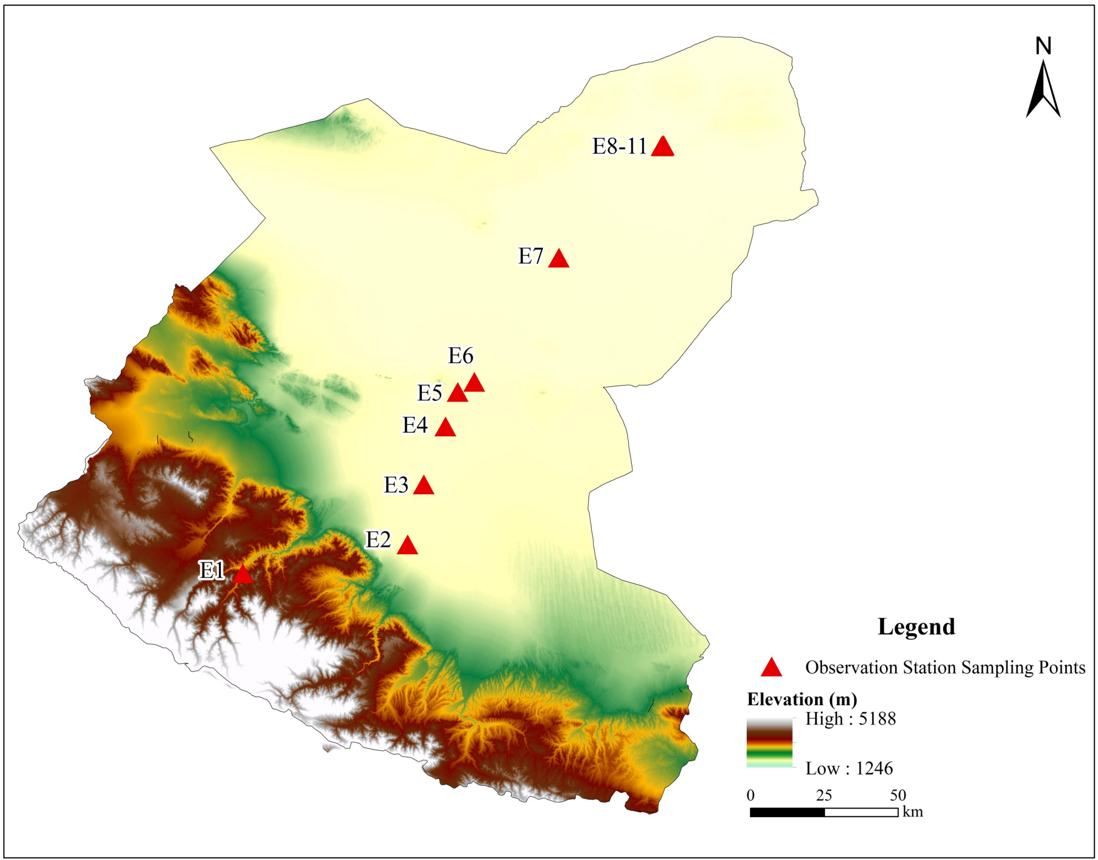

Figure R2. Distribution of Observation Station Sampling Points

Table R1. Soil Sampling Points in the Shiyang River Basin

Number	Sampling point	Electrical Conductivity（dS/m）	PH
E1	Huajian Township	1.20	8.41
E2	Wuwei Midstream	1.45	8.46
E3	Wuwei Basin	2.02	8.44
E4	Dongtan Wetland	13.82	8.36
E5	Hongyashan Reservoir Inlet	9.50	8.37
E6	Hongyashan Reservoir Outlet	14.43	8.30
E7	Datan Township	1.46	8.39
E8	50m West of Qingtu Lake	13.91	8.31
E9	50m East of Qingtu Lake	15.54	8.36
E10	100m West of Qingtu Lake	13.65	8.44
E11	100m East of Qingtu Lake	15.67	8.51

(3) Control Experiment Validation for River Basin

We conducted experimental field remote sensing data validation research in 2024, with specific steps including: delineating experimental plots - collecting soil samples -

laboratory analysis to determine actual soil salinity - conducting remote sensing monitoring of vegetation and salinity throughout the entire growing season - soil sampling throughout the entire growing season - comparative analysis of remote sensing monitoring results and experimental data for assessing their discrepancies and consistency. In the soil salinization area of Gulang County in the Shiyang River Basin (Fig. R3), the electrical conductivity measurement values were compared with the Salinization Index (Table R2). The results demonstrated that the electrical conductivity changes in saline soil samples were consistent with remote sensing monitoring results, with a high correlation coefficient, indicating a significant correlation between the two, thus the reliability of the remote sensing monitoring technology used.

Table R2. Soil Sample Electrical Conductivity and SI Comparison

County	Month	Mild Soil Salinization		Moderate Soil Salinization		Severe Soil Salinization	
		EC	SI	EC	SI	EC	SI
Gulang	March	3.63	4.37	11.46	4.23	14.67	4.45
	April	4.21	4.17	11.00	4.14	13.81	4.28
	May	4.06	4.10	10.70	4.07	13.67	4.20
	June	2.43	3.01	10.37	5.67	13.49	3.68
	July	3.06	3.30	10.49	4.53	13.20	3.90
	August	2.55	3.20	10.61	3.30	12.87	3.34

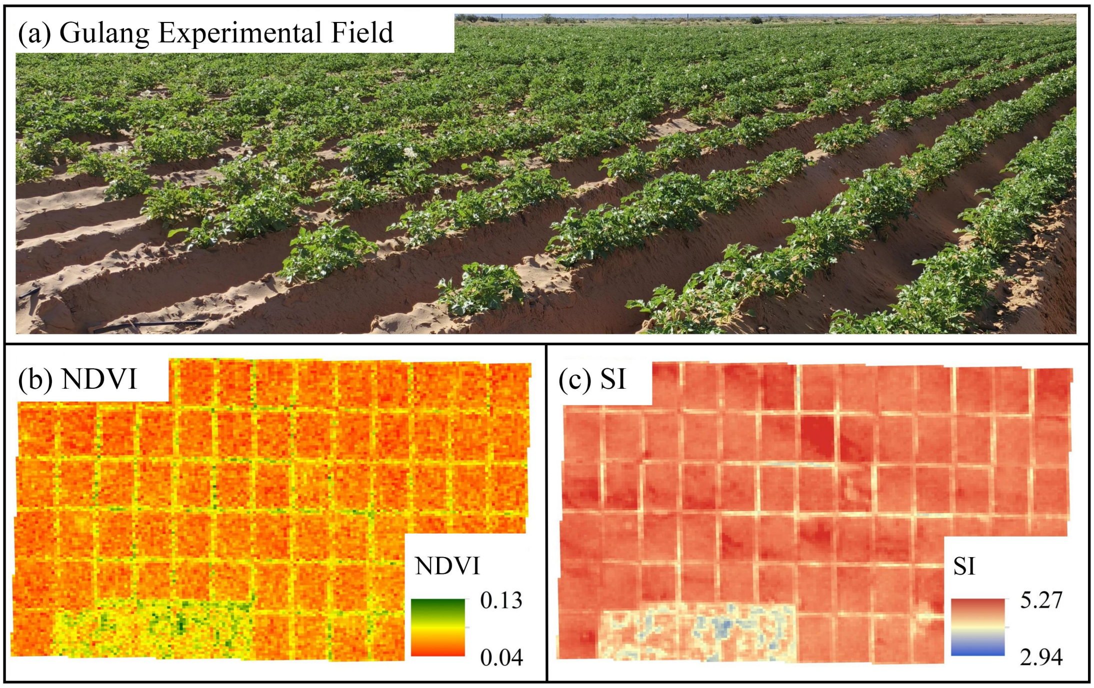

Figure R3. Experimental Field

3. From Figure 1 and 3, we cannot clearly see the salinity changes. I suggest the authors zoom in the satellite images, and compare for example two images before and after salinity, and highlight the salinitilized area. This can further strengthen your conclusion on the increasing of salinity in this region.

Respond: In the revised manuscript, Figure 1 is an overview of the study area, where Figures a and b represent two main aspects of the research, representing salinization caused by farmland irrigation and ecological water transfer, respectively. In Figure a, we selected the downstream Qingthu Lake, which shows significant salt distribution characteristics around it. Figure b focuses on salinization phenomena in oasis irrigation farmlands. Figure 3 is a schematic diagram showing the spatial distribution of salinization processes in the Shiyang River Basin. Considering the large basin area and dispersed salt distribution, we divided it into the middle and downstream sections to demonstrate its changes, with orange circles marking areas of significant variation. As shown below:

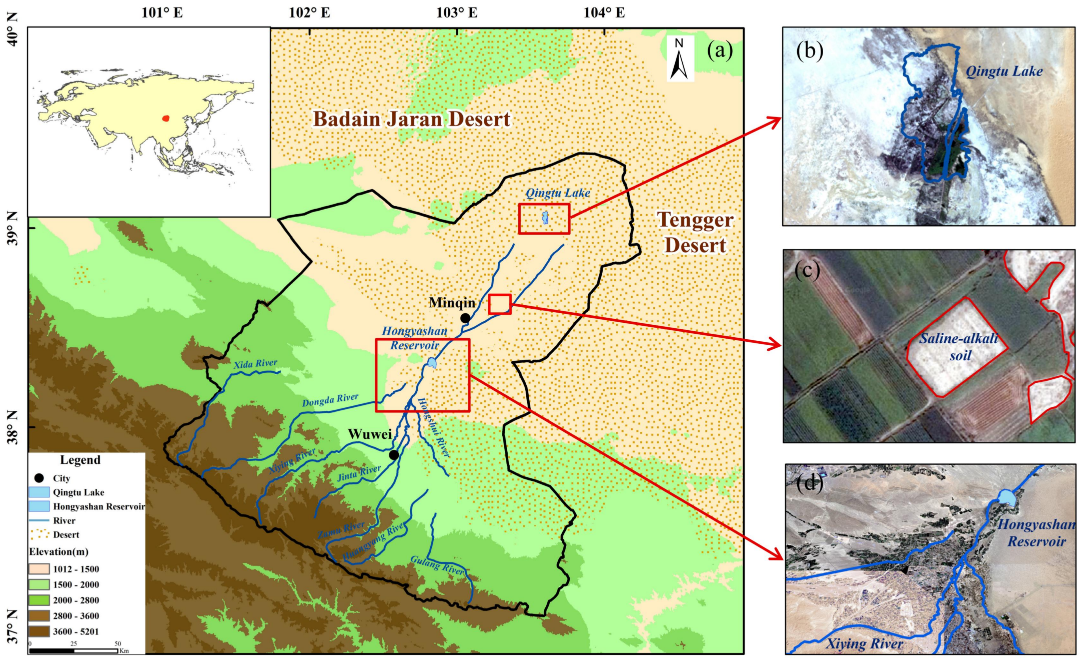

Figure 1. Overview map of the study area (a:Location distribution map of the Shiyang River Basin; b: Qingtu Lake (from USGS); c: Saline soils in agricultural land (from Google Maps); d: Distribution of water systems in the Shiyang River Basin (from USGS))

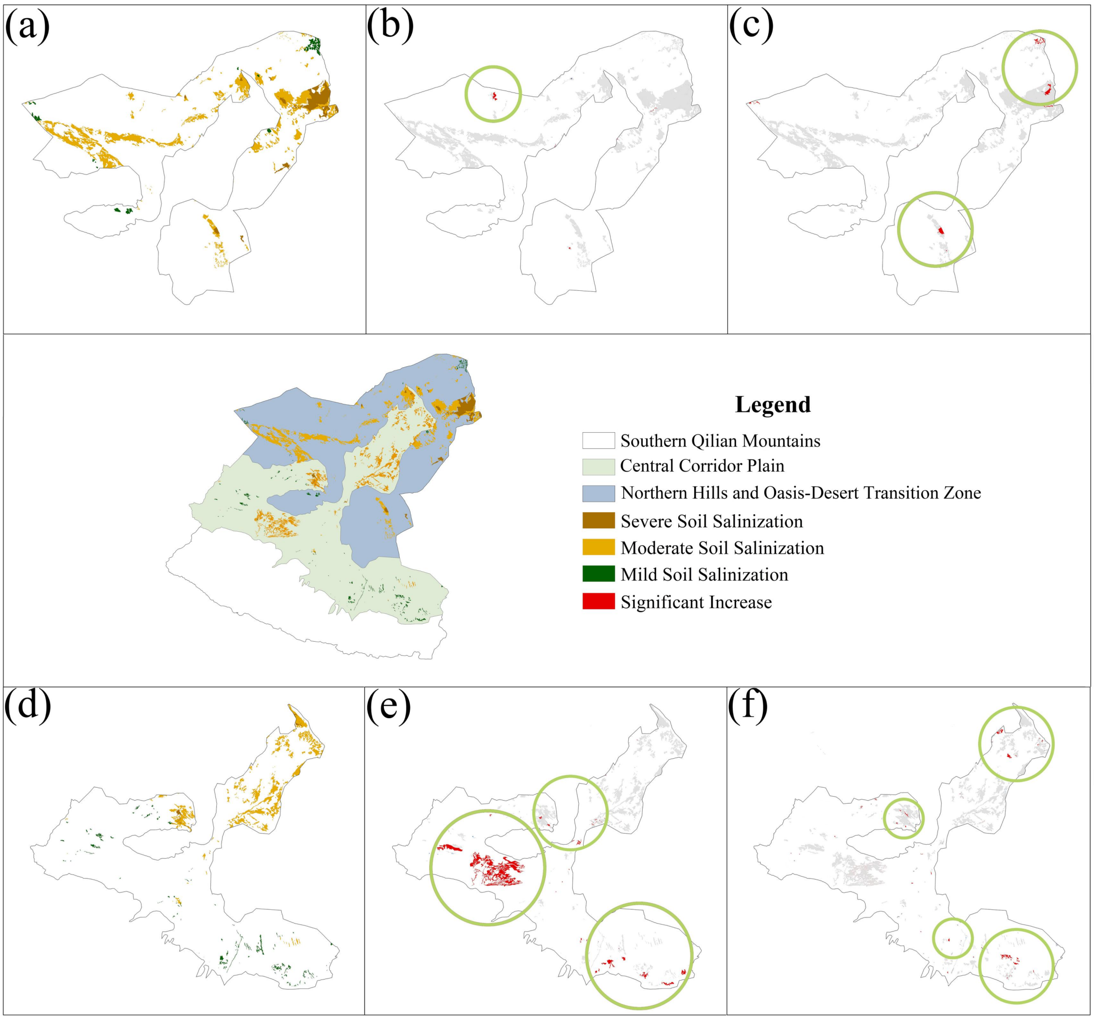

Figure 5. Spatial Distribution Map of Salinization in the Shiyang River Basin (a: Distribution of soil salinization in the northern hills and oasis-desert transition zone in 2002; b-c: Expansion areas in soil salinization in the northern hills and oasis-desert transition zone in 2012 and 2022; d: Distribution of soil salinization in the central corridor plain in 2002; e-f: Expansion areas in soil salinization in the central corridor plain in 2012 and 2022)

4. I suggest the authors separate apart and map out different mechanisms to explain salinity changes. For example, I am curious to see where the irrigation plays a dominant role in salinity, and where reservoir inundation area is a key factor. Using two conceptual diagrams to demonstrate these two mechanisms is likely a good idea.

I'm curious to know: is vegetation a good indicator for salinity? Can you do some analysis to test it? Does salinity have significant impacts on vegetation's root zone (https://hess.copernicus.org/articles/28/4477/2024/)?

Respond: We have already created two conceptual diagrams in the discussion section:

one illustrating the water conservancy project and salt cycle, and another depicting the water and salt cycle in agricultural irrigation, and have accordingly modified the discussion section, as stated in the following red text. Moreover, existing literature has proven that salinity significantly impacts vegetation, with high-salinity environments causing restricted root growth, reduced photosynthetic efficiency, and decreased biomass (Perri et al., 2020). Therefore, vegetation distribution characteristics can theoretically serve as an indirect indicator of salinity. However, our experimental research discovered clear limitations in using vegetation coverage as a single indicator. Different plants have varying salt tolerance, and focusing solely on vegetation coverage would overlook critical physiological and morphological changes in vegetation. Given the complexity of the research system, we plan to select experimental fields and forest-grassland sample plots in subsequent research for more cautious and systematic experimental validation, to reveal the intricate mechanisms between salinity and vegetation.

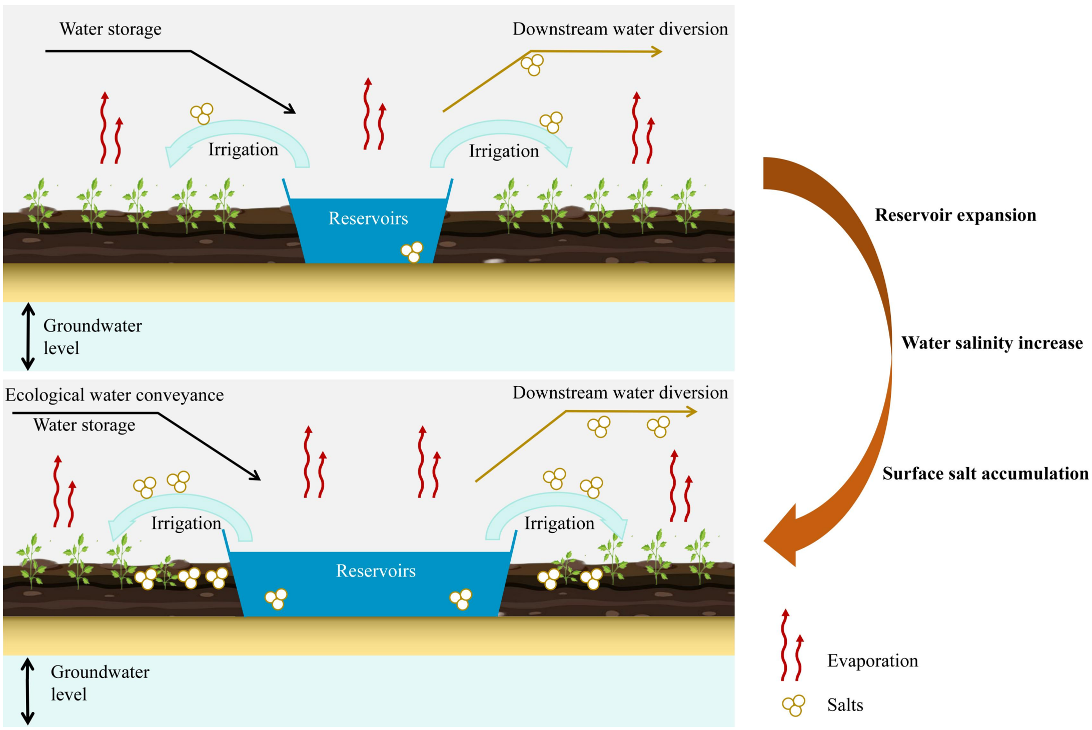

Figure 7. The process of salinization caused by reservoirs.

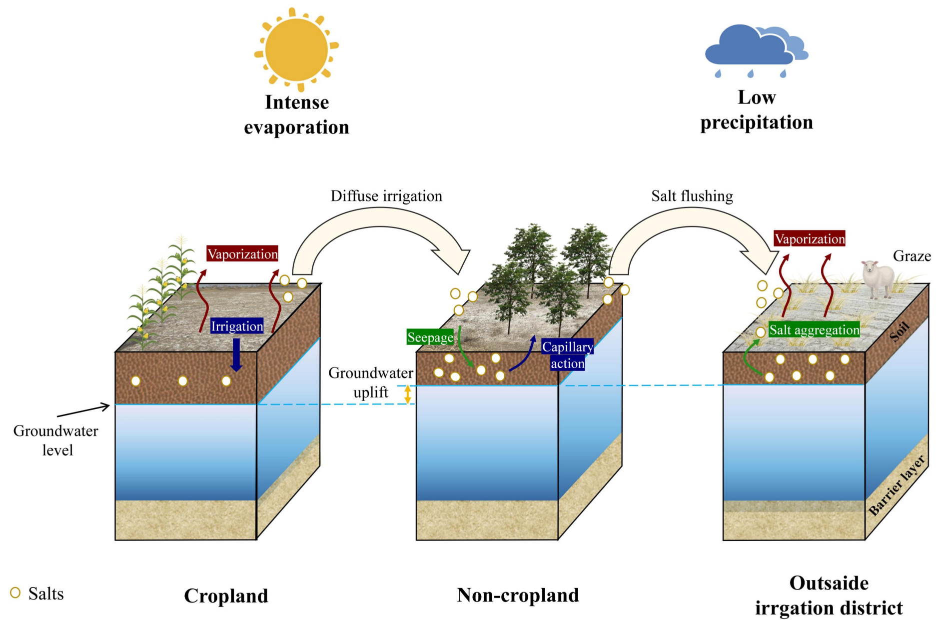

Figure 9.The process of salinization caused by agricultural irrigation

I cannot follow some statements:

Line 40-41: water bodies also impact soil quality, mainly through irrigation and precipitation. How water bodies can impact soil quality through precipitation?

Respond: The wording in this part was indeed ambiguous. The original intention was to express that water bodies, through two methods of precipitation and irrigation, can change groundwater levels and salt distribution, thereby affecting the physical and chemical properties of the soil. We have already reviewed and modified the entire text.As shown below:

Soil plays a critical role in promoting plant growth, regulating precipitation infiltration and distribution to coordinate watershed water cycles. Moreover, its purification capacity enables the decomposition of potential pollutants, thereby preventing water and air pollution to a certain extent (Bünemann et al., 2018; Renshu et al., 2024). However, once soil quality declines or undergoes degradation, it can cause irreversible damage and directly impact human life (Reynolds et al., 2007; Abu Hammad and Tumeizi, 2012).

There are many such confusing statements. Might be a good idea to invite an English native speaker, to carefully improve the writing all through this MS. My gut initial decision was rejection due to the still poor quality after giving a chance to revision. However, due to the importance of salinity issue in this region, I still don’t want to kill this paper. I give the authors one more and LAST chance to revise it. Hope to receive your good quality paper soon. If you need more time to do it, please let me know. I can extend the deadline.

Respond: Thank you for giving us the opportunity to revise our article and for providing valuable revision suggestions. We greatly appreciate this opportunity to revise, and we have thoroughly revised the entire manuscript according to your and the reviewers' recommendations. Thank you again.

Response to Reviewer#1:

Thank you for your valuable feedback, which has greatly improved our manuscript. I deeply appreciate your constructive suggestions and will carefully address each one with detailed responses.

In the revised manuscript, we have revised the content of the manuscript. **The revisions in the manuscript are indicated using blue font.** Below is a comprehensive overview of the modifications we have made:

General comments:

The study has been significantly improved and has become clearer and more understandable. Unfortunately, I have been found still several shortcomings that need to be improved. Therefore, I recommend the manuscript for further minor revisions.

Respond: Thank you once again for your valuable comments on the manuscript. They are very important for further improving the quality of the article. We have carefully revised the issues you raised.

Specific comments:

Materials and Methods:

1. Lines 104 – 108: General description of climatic conditions at the sites, include specific ranges of long-term meteorological variables (air temperatures, precipitation) for the period of the last 30 years (1991 – 2020).

Thank you for adding the precipitation and evaporation rates of the location. Please, also add annual air temperature and main climate zone according to the Köppen – Geiger climate classification (1991-2020) the area is located. Do not forget to include a citation with a link to the list of references to the used climate classification.

Respond: Thank you for your suggestions. We have added the annual mean temperature to the manuscript and identified the climate zones of the study area based on the Köppen – Geiger climate classification (1991 – 2020), along with the corresponding references, as shown below:

The study area is located in the BWK climate zone under the Köppen-Geiger climate classification, which is a cold arid desert climate (Beck et al., 2018; Beck et al., 2023). It features strong solar radiation, intense evaporation, significant diurnal temperature variation, and an annual average temperature below 8°C. Precipitation is sparse and primarily influenced by westerlies and monsoons. Mountain areas receive more precipitation than plains, with higher precipitation during summer and autumn, and significantly less during winter and spring. The terrain slopes from southwest to northeast and is divided into three units.

References：

Beck, H. E., McVicar, T. R., Vergopolan, N., Lutsk, N. J., Dufour, A., Zeng, Z., Jiang, X., van Dijk, I. J. M., and Miralles, D. G.: High-resolution (1 km) Köppen-Geiger maps for 1901－2099 based on constrained CMIP6 projections, Sci. Data, 10, 724, https://doi.org/10.1038/s41597-023-02549-6, 2023.

Beck, H. E., Zimmermann, N. E., McVicar, T. R., Vergopolan, A., Berg, A., and Wood, E. F.: Present and future Köppen-Geiger climate classification maps at 1-km resolution, Sci. Data, 5, 180214, https://doi.org/10.1038/sdata.2018.214, 2018.

2. Lines 111－116: Change the soil classification to one of the international classification systems, e.g. “World reference base for soil resources 4th edition (2022)”.

Please add also include:

- soil texture for the specified soil unit,
- citation in the text of the classification system for the specified soils, for example: .....Cryosols, Leptosols, and Phaeozems (WRB, 2022). Include the classification system in the list of used literature.

Respond: Thank you for your suggested revisions. We have added information on the soil texture of the soil units and included references for the soil classification system, as shown below:

The bedrock of the southern Qilian Mountains consists of metamorphosed sandstones and volcanic rocks, with soil textures predominantly coarse and medium, including Cryosols, Leptosols, and Phaeozems (WRB, 2022). The land is primarily forest and grassland, with annual precipitation of 300-600mm, evaporation rates of 700-1200mm, and the groundwater level is 50-200 meters below the surface. The central corridor plain features bedrock composed of schist and slate, with soil textures predominantly medium and fine, including Gypsisols, Calcisols, and Solonchaks. The land use is primarily agricultural, with annual precipitation of 150-300mm, evaporation rates of 1300-2000mm, and the groundwater level is 15-50 meters below the surface. The bedrock of the northern hills and oasis-desert transition zone is predominantly igneous rock, with soil textures mainly coarse, including Arenosols, Leptosols, and Solonchaks. The landscape is barren, with annual precipitation below 150mm, evaporation rates of 2000-3000mm, and the groundwater level is 10-30 meters below the surface. The three geomorphological units show distinct differences, with increasing aridity from south to north.

References：

IUSS Working Group WRB: World Reference Base for Soil Resources. International soil classification system for naming soils and creating legends for soil maps, 4th edition, International Union of Soil Sciences (IUSS), Vienna, Austria, ISBN 979-8-9862451-1-9, 2022.

Response to Reviewer#2:

Your valuable insights have significantly contributed to enhancing the quality of our manuscript. I feel extremely honored to receive such positive and constructive feedback from you. I genuinely appreciate every thoughtful suggestion you've provided and will address each one of them with utmost care, offering detailed responses in return.

In the revised manuscript, we have meticulously restructured and refined the logic and content of the abstract, introduction, discussion, and image sections. **The revisions in the manuscript are indicated using blue font.** Below is a comprehensive overview of the modifications we have made:

General comments:

One of the key conclusions of the study is that human activities have become a decisive factor in altering the salinization patterns of inland river basins. While this finding is significant, the evidence presented—namely, a simple comparison between irrigation areas and the regional distribution of soil salinization—does not provide sufficient support for such a conclusion. A more rigorous statistical approach is necessary to quantitatively assess the impact of human activities on salinization. For example, a time series analysis comparing the number of water conservancy projects constructed in the basin over the last decade with trends in soil salinization could offer stronger evidence. Similarly, comparing irrigation levels with salinization trends in a statistical manner would help substantiate the argument that increasing salinization is primarily driven by human activities, rather than being solely attributed to natural climate changes over the past decade. This more thorough analysis would significantly strengthen the study's conclusions.

Respond: Thank you very much for your insights. To provide more comprehensive content, we have diligently reviewed and refined the abstract, introduction, literature review, research methods,results, discussion and conclusion, aiming to enhance the depth of our research focus.

Specific comments:

#1

The "Background Conditions of the Study Area" section would benefit from additional climate information. Providing more detailed climate data in a numeric way, such as temperature, precipitation patterns, and seasonal variations, would offer a clearer understanding of the environmental context of the study area.

Respond: Thank you for your suggestions. We have added more detailed climate data, including climate classification, annual average temperature, and precipitation patterns, in the "Background Conditions of the Study Area" section, as shown below:

The Shiyang River Basin is located in northwestern China, at the eastern end of the Hexi Corridor. It consists of eight major tributaries: the Dajing River, the Gulang River, the Huangyang River, the Zaomu River, the Jinta River, and the Xiyang River (Fig. 1). Lakes and wetlands in the whole region mainly exist in reservoirs, with 15 reservoirs built with a more than 1 million cubic meters capacity. Water storage in reservoirs helps to adjust the distribution of river water. The study area is located in the BWK climate zone under the Köppen-Geiger climate classification, which is a cold arid desert climate (Beck et al., 2018; Beck et al., 2023). It features strong solar radiation, intense evaporation, significant diurnal temperature variation, and an annual average temperature below 8°C. Precipitation is sparse and primarily influenced by westerlies and monsoons. Mountain areas receive more precipitation than plains, with higher precipitation during summer and autumn, and significantly less during winter and spring. The terrain slopes from southwest to northeast and is divided into three units. The bedrock of the southern Qilian Mountains consists of metamorphosed sandstones and volcanic rocks, with soil textures predominantly coarse and medium, including Cryosols, Leptosols, and Phaeozems (WRB, 2022). The land is primarily forest and grassland, with annual precipitation of 300-600mm, evaporation rates of 700-1200mm, and the groundwater level is 50-200 meters below the surface. The central corridor plain features bedrock composed of schist and slate, with soil textures predominantly medium and fine, including Gypsisols, Calcisols, and Solonchaks. The land use is primarily agricultural, with annual precipitation of 150-300mm, evaporation rates of 1300-2000mm, and the groundwater level is 15-50 meters below the surface. The bedrock of the northern hills and oasis-desert transition zone is predominantly igneous rock, with soil textures mainly coarse, including Arenosols, Leptosols, and Solonchaks. The landscape is barren, with annual precipitation below 150mm, evaporation rates of 2000-3000mm, and the groundwater level is 10-30 meters below the surface. The three geomorphological units show distinct differences, with increasing aridity from south to north.

#2

For better clarity, I recommend consolidating all data sources into a single comprehensive table. This will provide a more transparent overview of the data leveraged in the study and allow readers to easily assess the different datasets used.

Respond: Thank you for your valuable suggestions. We have organized all the data sources in Table 1 to present the dataset more clearly, making it easier for readers to understand, as shown below:

Table 1. List of data products used in the study

Products	Temporal resolution	Spatial resolution	Temporal coverage	Data Source
Landsat-5	16d	30m	1984-2013	https://earthxplorer.usgs.gov
Landsat-7	16d	30m	1999-present	https://earthxplorer.usgs.gov
Landsat-8	16d	30m	2013-present	https://earthxplorer.usgs.gov
Landsat-9	16d	30m	2021-present	https://earthxplorer.usgs.gov
Landuse	Annual	30m	1985-2022	https://zenodo.org/records/8176941
ASTER GDEM	/	30m	2000-2019	http://reverb.echo.nasa.gov/reverb/

#3

In the discussion section, it would be helpful to include a more thorough examination of the potential limitations of the study. Discussing factors such as data constraints, assumptions, or other uncertainties would strengthen the study’s credibility and provide a balanced perspective.

Respond: Thank you for your suggestion. Incorporating uncertainty analysis in the discussion is indeed very important. Therefore, we have included a discussion on the uncertainties related to the data and other aspects in the manuscript, as shown below：

This study analyzed soil salinization in the Shiyang River Basin using Landsat satellite data. However, due to the inherent uncertainties of satellite data, the results may have certain limitations. Although satellites can provide multispectral data, the spectral resolution is relatively low, and atmospheric correction issues may also affect data accuracy, posing challenges for identifying soil salinization (Vicente-Serrano et al., 2008; Vanonckelen et al., 2013). Landsat has a revisit cycle of 16 days, which can be further extended by climatic effects during certain seasons, significantly limiting seasonal monitoring of the region. Additionally, the selection and quantity of training data directly affect the accuracy of supervised classification. An accuracy assessment of the supervised classification results revealed classification accuracies of 89.40%, 88.37%, 89.80%, 99.52%, and 96.83% for the years 2002, 2007, 2012, 2017, and 2022, respectively, with kappa coefficients of 0.82, 0.81, 0.82, 0.99, and 0.95. However, due to the limitations of sampling size and satellite data, the identification of mildly saline-alkaline land is slightly less effective compared to other types of land, which requires further improvement in future work. Because soil salinization is influenced by multiple interacting factors such as climate and irrigation, single-satellite data alone struggle to fully capture the variation of all environmental components. Future research will expand data sources by integrating field measurements, meteorological records, and irrigation information to obtain more comprehensive or higher-resolution multi-source fusion data. Our systematic soil salinity monitoring for this basin began in 2019, which represents a limited timeframe that prevents us from comprehensively validating remote sensing interpretation results using long-term soil physicochemical parameter data. Consequently, current accuracy assessments primarily relies on field-verified sample points collected between 2019 and 2024, which somewhat constrains our ability to verify the long-term dynamic processes of saline land changes. Nevertheless, these validation points still provide important ground truth references for remote sensing monitoring results. Moreover, the application of deep learning models for image classification and feature extraction could deepen our understanding of the driving mechanisms behind soil salinization distribution, thereby improving the applicability of such findings in hydrology and soil management.

#4

Please specify the country in which the study sites are located. This information is essential for providing geographical context to the research and enhancing its clarity for readers.

Respond: Thank you for your suggestion. In the "The Background Conditions of the Study Area" section, we have already specified that the study area is located in the northwestern part of China, and Figure 1 indicates its location on the Eurasian continent, as shown below:

The Shiyang River Basin is located in northwestern China, at the eastern end of the Hexi Corridor. It consists of eight major tributaries: the Dajing River, the Gulang River, the Huangyang River, the Zaomu River, the Jinta River, and the Xiyang River (Fig. 1).

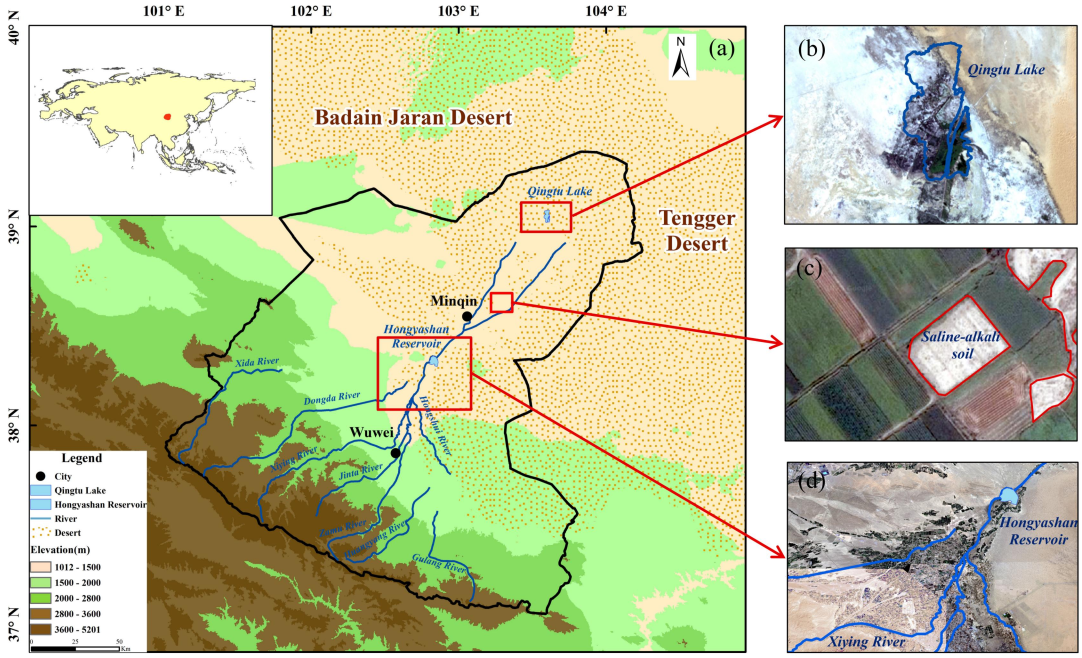

Figure 1. Overview map of the study area (a:Location distribution map of the Shiyang River Basin; b: Qingtu Lake (from USGS); c: Saline soils in agricultural land (from Google Maps); d: Distribution of water systems in the Shiyang River Basin (from USGS))

#5

In the discussion section, please clarify or justify whether the study region can be considered representative of typical inland river basins. This will help contextualize the findings.

Respond: Thank you for your valuable suggestion. Regarding whether the research area can be considered a representative of typical inland river basins, we have clarified this in the discussion section and cited relevant literature. We added a detailed analysis of the region's representativeness in the discussion section, as shown below:

4.1 Soil salinization and basin water conservancy project

The Shiyang River Basin is a typical inland river basin whose geographical and climatic characteristics provide a unique background for studying salinization phenomena, making it an ideal area for researching salinization processes (Ji et al., 2006; Zhu et al., 2022). Long-term monitoring through multiple observation points in the basin has revealed that the salinization issue shows a tendency to worsen. As water diversion projects advance and water transfer volumes increase, agricultural irrigation water will inevitably increase significantly (Rui and Hang, 2023). The input of external water will necessarily disrupt the balanced state between regional soil, vegetation, and climate, thus requiring careful attention to salinization issues arising from agricultural irrigation (Abbas et al., 2013; Thorslund et al., 2021). In the long term, secondary salinization is poised to become the primary potential obstacle to sustainable inter-basin water transfer (Karimzadeh et al., 2024). Its negative effects are reflected in two aspects: the altered evaporation process following water irrigation and the groundwater level rise caused by external water sources (Duan et al., 2022). The connectivity between groundwater and soil moisture increases, making the trend of salt concentration through evaporation to the surface more pronounced. In arid regions with low rainfall and high evaporation, this will lead to salt accumulation in the soil surface from dissolved salts (Aboelsound et al., 2023). In the upstream of the Shiyang River Basin, natural water sources such as precipitation and snowmelt are introduced into irrigation districts (Zhu et al., 2022); the middle reaches improve water resource supply by constructing reservoirs and channels (Sang et al., 2023); the downstream primarily relies on upstream Shiyang River water and ecological water transfers (Qiu et al., 2023). In the basin's ecological water transfer, water diversion from the Hongyashan Reservoir to Qingthu Lake is a crucial measure for adjusting irrigation water patterns (Fig.7). The Jingdian Phase II water diversion project started in 2001, continuously introducing Yellow River water to downstream areas. These water conservancy projects have effectively alleviated water resource constraints in the basin's downstream to some extent, but may lead to further accumulation of soil salinity.

4.2 Soil salinization and irrigation

Developing irrigated agriculture is necessary to meet the continuously growing global food demand (Jägermeyr et al., 2017). In agricultural production, irrigation is a critical cause of salinization. Clarifying the relationship between salinization and irrigation and providing potential solutions is crucial. From 2002 to 2007, the basin's irrigation area increased from 5,131.35 km² to 5,381.58 km², showing a significant upward trend, while the salinization area showed a contrary downward trend. From 2007 to 2012, the irrigation area decreased, but the basin's salinization area increased. From 2012 to 2017, the basin's irrigation area notably decreased by about 100 km², while the salinization area remained relatively unchanged. From 2017 to 2022, the irrigation area rebounded significantly, exceeding 5,300 km², simultaneously with a substantial decline in salinization area. In the short term, an expansion of irrigation area is usually accompanied by a reduction in salinization area, while a decrease in irrigation area corresponds to an increase in salinization area. This phenomenon indicates that moderate irrigation can temporarily reduce salt concentration in the soil surface layer through leaching, alleviating soil salinization. However, from a long-term perspective, salinized lands in the Shiyang River Basin are primarily distributed within irrigation areas, revealing another causal relationship between irrigation and salinization. Without scientific irrigation management, prolonged over-irrigation coupled with inadequate drainage systems leads to groundwater level rise, causing deep-layer salts to move upward, while dissolved salts in irrigation water accumulate in the soil through water evaporation (Minhas et al., 2020). This cumulative effect ultimately exacerbates soil salinization problems. From 2002-2022, the conversion rate of fallow land to saline land was 7.11%, significantly higher than grasslands (5.68%) and cultivated lands (2.92%). This difference highlights the critical role of continuous irrigation in suppressing soil salinization, but also reveals that without effective irrigation and salt elimination mechanisms, the region's agricultural ecosystem faces extremely high salinization risks.