

1 Evolution of China's water issues as framed in Chinese mainstream newspaper

2
3 **Abstract:** There is an urgent need globally to trigger fundamental societal changes in water
4 **management** away from existing unsustainable paradigms. This paper attempts to understand
5 the evolution of newspaper coverage of water issues in China by analyzing water-related
6 articles in a major national newspaper, *the People's Daily*, over the period 1946-2012 using a
7 content analysis approach. The major findings include: 1) water issues **were** in relatively
8 **prominent** positions in the newspaper; 2) **the reporting of water issues** in China experienced
9 three stages: 1946 to the middle of 1980s - flood and drought control and water for food
10 **production**; the middle of 1980s to 1997 - water for economic development; and 1998 to the
11 present - water for the environmental sustainability and economic development; 3) **the**
12 **reporting of water issues** in the *People's Daily* clearly reflected China's top-down water
13 resources management system, **and** no "real" public opinions on water were reported during
14 the study period; 4) The *People's Daily* is just a wind vane of Chinese mainstream values and
15 policies on water. **The** findings supported the realist assumption that the societal **value**
16 changes on water issues in China were triggered by a **range** of factors including biophysical
17 pressure (floods and droughts), political campaign (the Cultural Revolution),
18 macro-economic reform (Reform and Opening-up), water institutional arrangement (the
19 Water Law) and water management reform (the No. 1 Central Document on water reform).
20 **While there are similarities and differences between this study and other studies, important**
21 **implications for more sustainable water management are a need to strengthen academic**
22 **specialists' and NGO's voices in the newspaper to create a better informed public, and to**
23 **stimulate practices toward sustainable water use.**
24

25 **Keywords:** Water issue, media reporting, the Newspaper, Content analysis approach, China
26
27

28 INTRODUCTION

29
30 There is an urgent need globally to trigger fundamental changes in water **management** away
31 from existing unsustainable paradigms. As with other significant transitions in natural
32 resource **management**, such changes can be expected to be non-linear processes of social
33 change as they transform from one stage to another (Rotmans et al. 2001). There is a
34 considerable volume of empirical studies that focus on the dynamics of transitions (Geels
35 2010), and in particular, on the stages and processes of water management transitions
36 (Loorbach and Rotmans 2006; van der Brugge et al. 2005; Rotmans and Kemp 2003;
37 Rammel et al. 2007; Norgaard et al. 2009; Kallis 2011). Ecological realism proposes that it is
38 increases in the scarcity of natural resources that creates the necessary thrust for changes of
39 water management, while social constructivists, on the other hand, think that societal values,
40 attitudes and opinions may be able to drive the evolution of water management (**Tàbara** and
41 Ilhan 2008). However, the question of why transitions in water management occur remains
42 largely unexplained (Pahl-Wostl 2007; Geels 2011; Frantzeskaki 2011).
43

44 **Since the twentieth century water management based on hydrological sciences has**
45 **developed relatively good understanding of the biophysical processes of water cycles, but it**
46 **has resulted in little understanding of the evolutionary processes of societal values on water.**
47 **Current water management paradigms have been insensitive to changes in societal values and**
48 **blind to societal responses to management decisions. Thus the development of understanding**
49 **of changes in societal values on water is urgently needed to facilitate the transition towards**
50 **sustainable water management. The news media are the central interpretative system of**

51 modern societies (Schmidt et al. 2013). Many studies have shown that the media not only
52 influence and reflect public values, attitudes, and opinions on natural resource management
53 and environmental issues (Hoffman 1996; Hale 2010; Murphy et al. 2014), but also influence
54 policy agenda for these issues (e.g., Downs 1973; Schoenfeld et al. 1979). Only a few studies
55 have been conducted on the media reporting of water issues (Hale 2010; Altaweel and Bone
56 2012; Hurlimann and Dolnicar 2012; Murphy et al. 2014; Wei et al. 2015). To our knowledge,
57 except for Wei et al (2015)'s study in Australia, all these studies were restricted to data
58 collected over periods of months and did not permit any observation of the evolution of water
59 issues over longer timeframes. Furthermore, none of the previous studies aimed to explain the
60 evolutionary processes of water issues reported in the news media.

61
62 With increasing water scarcity and water pollution in recent decades, water issues have
63 received increasing attention in China. A large body of studies on water issues in China has
64 been reported in the literature. These studies cover very broad topics including water supply
65 management, water demand management, water quality management, mitigation of flood or
66 drought disasters, coping with climate change, water legal and institutional arrangements, and
67 stakeholder participation. However, integration of societal values analysis into water
68 management is very limited. Water issues in China are of global significance and require
69 solutions beyond its borders. Administratively, China has retained a traditional top-down
70 system which dominates public sector management, including water, agriculture and the
71 environment. The Chinese media model is likely to be very different from those of western
72 democracies. Differences in the political, administrative and media models between China
73 and other countries pose challenges and opportunities for studies on understanding the
74 reflection of media of water issues.

75
76 In this study we aimed to understand the evolution of newspaper coverage of water issues
77 in China by analyzing water-related articles in a major national newspaper during 1946-2012
78 using a content analysis approach. Specifically, the objectives are: 1) to describe how water
79 issues were reported and portrayed to the public; 2) to understand the patterns of changes in
80 water reporting over the years and why issues enter and move off the media's agenda. It is
81 expected that the findings will assist water policy practitioners' understanding of the media
82 coverage and attitudes to water issues and catalyze better ways of implementing water
83 resources management. The findings may reveal lessons on water resource management in
84 China that might not emerge from other countries.

85 86 **METHODS**

87
88 We applied content analysis to examine media coverage of water issues in China. Content
89 analysis is a research method that uses a set of procedures to make valid inferences from text
90 (Weber 1990). It has been utilized in a variety of fields for "mining" large quantities of
91 unstructured textual data in order to determine public attitudes, media tone/bias, issue
92 relevance, and issue framing (Sirmakessis 2004). The steps included selection of the media,
93 determination of sampling strategy, development of coding strategies, and interpretation of
94 coding results.

95 96 **Media selection**

97
98 Newspapers were chosen as the source media for reports on water issues. Newspapers are a
99 good source of information on public issues as they provide readers with in-depth and
100 continuous flows of information that expand the initial knowledge base on a certain public

101 issue, and require active involvement by readers (Wattenberg 2008). In addition, the authority
102 and public confidence in newspapers cannot be substituted by any other media. In particular,
103 newspapers can provide a historical perspective on public opinion that may not be otherwise
104 available. Neither radio, television nor web news can be collected systematically as they have
105 not been stored consistently in an accessible form.

106
107 The *People's Daily* was selected as the newspaper source of water-related articles. Its
108 publication started on May 15, 1946, as the official newspaper of the Chinese Communist
109 Party's (CCP's) Central Committee and the Central Government. The *People's Daily* is
110 considered to be the most influential and authoritative paper in China and enjoys the largest
111 circulation in the country. *The People's Daily* strongly influences public opinion and has wide
112 coverage of public affairs. It is also a repository of Chinese political directions and public
113 opinions (People's Daily 2015). For major events and issues the newspaper also sets the tone
114 of coverage that other Chinese newspapers, from the national to the local level, have to
115 follow (Song and Chang 2012). In addition, it is the oldest newspaper in modern China and
116 provides an electronic version since it was first issued in 1946. *The People's Daily* has
117 become as the researchers' primary choice in longitudinal media studies.

118 119 **Sampling**

120
121 Simple random sampling, constructed week sampling, and consecutive days sampling are the
122 three main sampling methods used for newspaper article analysis. The cyclic nature of media
123 content can render simple random sampling inefficient. Constructed week sampling requires
124 that all the days of the week be represented and thus can presumably control for sources of
125 systematic variation of content for different days of the week (Riffe et al. 1993). However,
126 the procedure ignores between-week differences, and possibly misses important "news
127 weeks" when the paper focuses on particular issues over an entire week (e.g. 'China Water
128 Week') (Hester and Dougall 2007; Song and Chang 2012). Consecutive day weekly sampling
129 selects a convenient sample of seven continuous days to account for the cyclical variation for
130 different days of the week. It can pick up important weeks, but not surprisingly, it may not be
131 a reliable means of estimating content over a long period (Riffe et al. 1993). Therefore, both
132 constructed week and consecutive days were selected as the sampling methods in this study.

133
134 Each year of the 67 year period from 1946 to 2012 was sampled in this study, which
135 avoids the problem of an uneven distribution of years, and also minimizes the chance of
136 missing unusual years. For each year the sample consisted of two constructed weeks and two
137 consecutive days weeks. One constructed week was comprised of seven randomly selected
138 days from Monday to Sunday in the first half year and the other week was similarly
139 constructed in the second half of each year. During 1946-1987 two consecutive days
140 sampling weeks were randomly sampled from the first half and second halves of each year.
141 As the China Water Week started on 1st of July from 1988 to 1993 and the 22nd of March
142 since 1994, one consecutive days week was chosen from these Water Weeks in these years,
143 the other consecutive days week was randomly sampled from the other half year.

144
145 *The People's Daily* Graphic Database includes all articles during the entire study period
146 (1946-2012). The total number of the *People's Daily* issues obtained with this sampling
147 procedure over the study period was 2,043.

148 149 **Criteria for article inclusion**

150

151 We used the word ‘water’ (in Chinese) for retrieval of articles from the database. **The total**
 152 **number of retrieved articles was 148,086.** All these articles were downloaded and saved as a
 153 “raw database”. **They were then reviewed individually by a group of 3 researchers over a**
 154 **period of 20 months.** Articles were removed if they only included incidental mentions of the
 155 word ‘water’ **and** did not pertain to any issues about water governance, water supply, water
 156 demand, irrigation and drainage, soil conservation, flood and drought mitigation, water
 157 pollution, river basin management and environmental water conservancy. **The number of**
 158 **articles that were directly relevant to water issues and included for analysis was 2026.**

159

160 **Article coding**

161

162 We designed a group of variables based on the tables proposed by Hale (2010) and Joshi et al.
 163 (2011) to code each article of the newspaper according to media agenda-setting theory and
 164 media framing theory (Table 1). **It is hypothesized in** the agenda-setting theory **that the**
 165 **intensity of media coverage of an issue correlates with the perceived issue salience by the**
 166 **public** (Cohen 1963). Therefore it is very important to indicate the salience of the issues by
 167 measuring the number and types of articles and location of articles **in** the newspaper.
 168 According to the media framing theory the media both influence and indicate public opinion
 169 on certain issues by deliberately framing the stakeholders (the people and organizations with
 170 a stake in a certain public issue), situations (the situation in which the stakeholders interact),
 171 and perspectives (the varied viewpoints of these stakeholders on **a** public issue) (Howland et
 172 al. 2006; An and Gower 2009). These content variables were included in the coding strategy
 173 (Table 1).

174

175 The coding variables were grouped into three categories. The first category provides a
 176 descriptive account of the information in terms of the location and type of news articles. The
 177 second category provides the articles’ content context information which **was designed to**
 178 **describe** in which geographic locations and the water bodies the topics were located. It also
 179 includes the institutions involved (whose voices were being reported), related policies and
 180 initiatives (what was discussed) and natural and artificial events (what were the situations). In
 181 this paper, water policies and initiatives include related laws, regulations, and policies
 182 developed by the state and provincial governments. The third category provides the articles’
 183 thematic information which includes the themes and tones of news articles. The article tone
 184 was coded as “environmental **protection-driven**”, “economic development-**driven**” and “not
 185 mentioned”. The tone was considered as economic development oriented if articles catered for
 186 the needs of economic development such as construction of dam and irrigation infrastructure
 187 for consumptive use. Articles concerned with ecosystem degradation or water pollution were
 188 designated as “environmental **protection-driven**”. These two tones were coded to reflect two
 189 distinct dimensions of opinions on water issues.

190

191

Table 1 Description of coding variables

Category	Variables	Description
I: Article information	Article location	Page on which the article was published.
	Article type	We grouped article into news reports, editorials, byline, in-depth reporting, correspondence, hotspot interpretation, mention, data and information, and others.
II: Context information	Administrative area	Location of the province and city where the issue discussed occurred.
	Water bodies	Water bodies that were referenced in the article.
	Institutions	Organizations that were mentioned in the articles. We grouped them into the national government agencies, river basin management

		agencies, water engineering management agencies, local water management agencies, local environmental protection agencies, other local agencies, scientific and social organizations, enterprises, and others. It should be noted that ‘local’ means provincial and lower levels of administrative areas in this paper.
	Major policies	Policy/management initiatives mentioned in the articles.
	Major events	Major events included: flood, drought and water pollution.
III: Thematic information	Themes	Ten themes were included: flood control and drought relief, irrigation and drainage, urban and rural water supply, water resources management, water engineering construction, water quality management, water resources protection, water saving, education, science and culture, and others.
	Article tone	Article tones were recorded into three thematic dimensions: “economic development-driven”, “environmental protection-driven” and “not mentioned”.

(Revised, based on Wei et al. 2015)

192
193

194 Coding was conducted manually because we believe human coders are more alert to any
195 implied elements of arguments in their context. Each relevant article was read and information
196 was extracted into a database. To allow assessment of coding consistency 5% of articles from
197 each year were randomly selected for double coding by two research assistants. We used
198 Scott’s Pi statistics (Scott 1955) to determine the level of agreement between coders for
199 questions with mutually exclusive answers. The reliability was 86.2%. This is well above
200 80% as recommended by Riffe et al. (2005) indicating a high level of inter-coder reliability.

201

202 **Statistical and trend analysis**

203

204 Following article coding, we firstly used descriptive statistics to describe the spatial and
205 temporal trends of the main variables. Then, **we described and explained** any transitions of
206 water issues reporting **if they** exist **with** two thematic variables: theme and tone of news
207 articles. Both of them reflect changes of public values, attitudes, and opinions on water issues
208 in news coverage.

209

210 **RESULTS**

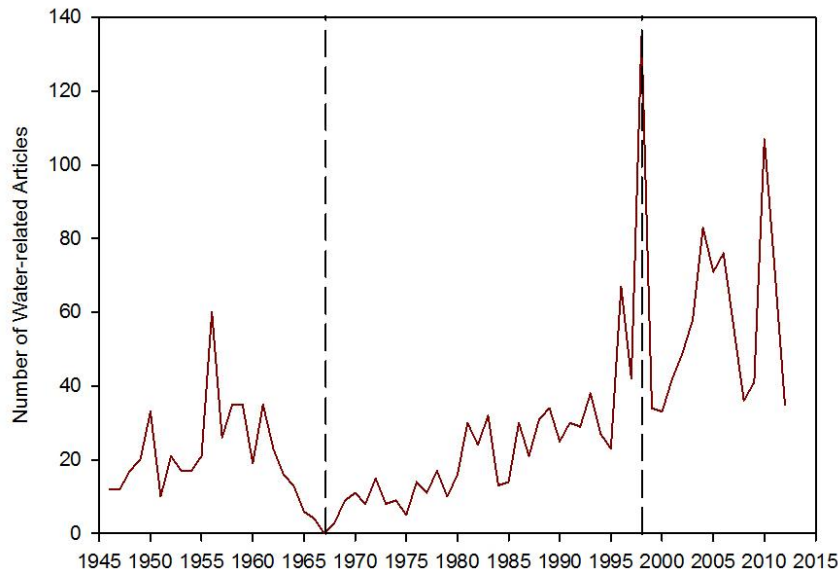
211

212 **Characteristics of water-related articles**

213

214 The **total** number of articles **directly relevant to water issues and included in the analysis** was
215 2026. The number of water-related articles reported each year changed with time (Figure 1).
216 The results suggest that the overall period can be divided into three stages: 1946-1967,
217 1968-1997, and 1998-present. In the first stage the number of water-related articles initially
218 showed an increasing trend that peaked in 1956 when Chinese agriculture **was** collectivized
219 in the early years of the communist government. The collectivization appears to have greatly
220 promoted an upsurge of water conservancy construction. The frequency of water-related
221 articles decreased to zero by 1967 during the Chinese Cultural Revolution when all the
222 nation’s economic activities almost stagnated. In the second stage, the number of
223 water-related articles increased steadily and peaked in 1998 when China experienced
224 disastrous flooding by the Yangtze and Songhuajiang Rivers. In the third stage, there were
225 two obvious peaks in the number of articles reported. In 2003-2005 the revised Water Law,
226 issued on August 29th, 2002, was implemented and followed by a series of water resources
227 management reforms in China, and there appears to be an increased frequency of the
228 reporting of water-related articles during this time. During 2010 there were serious droughts

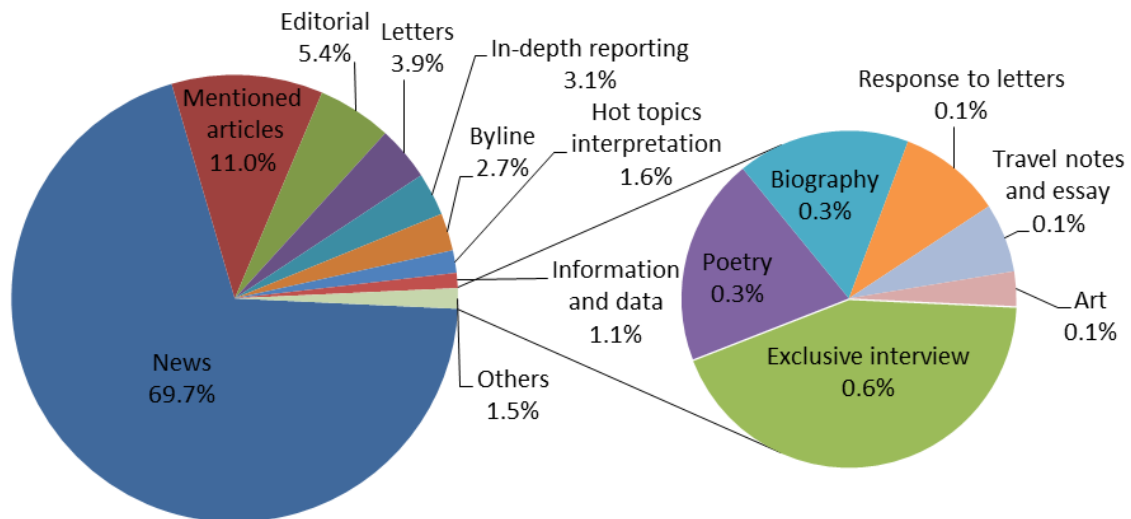
229 in the west-southern regions of China and the Ministry of Water Resources started to develop
 230 severe water conservation measures.



231
 232 **Figure 1** Number of water-related articles from 1946 to 2012

231
 232
 233
 234
 235
 236
 237
 238

In terms of the distribution of article types, news reports directly and mainly concerning water were greater than other types and accounted for 69.7% of all water-related articles. Articles in which water was only mentioned and was not the core topic were 11.0% of the total and editorial articles accounted for only 5.4% (Figure 2).



239
 240 **Figure 2** Types of the water-related articles

239
 240
 241
 242
 243
 244
 245
 246
 247
 248
 249

The layout of the *People's Daily* has been revised 8 times since 1946. Most of the water-related articles were published on the front page to the third page before 2003 when the number of total pages was less than 12. After 2003, most of the water-related articles were published on the first six pages, although the number of total pages increased significantly. These results reflected the priority of water-related articles in the context of the other news stories reported at the time.

Administrative regions and water bodies reported in water articles

250
251
252
253
254
255
256
257
258
259
260
261
262
263
264

The regions reported by the water-related articles covered all 34 provinces and autonomous regions of China, but the articles were mainly from the middle and eastern regions where the precipitation is relatively high and the economy is developed (Figure 3). Water-related articles were most frequently reported from Hubei and Henan 106 and 102 times/year, respectively. These two provinces are located in the lower reaches of the Yangtze River and the Yellow River, respectively, and are prone to flooding. Some of the large water control projects were built on these rivers during the reporting period. For example, the famous Three Gorges and Gezhouba Water Control Projects are located in Hubei Province, and the Sanmenxia and Xiaolangdi Water Control Projects are located in Henan Province. In addition, these provinces are the prominent agricultural provinces of China. At the level of city and county, 384 counties and cities were reported 572 times in total. Wuhan, the capital city of Hubei Province, was reported most frequently (20 times), followed by Harbin City (12 times) in the Songhuajia river basin, north eastern China, which is also prone to flooding.

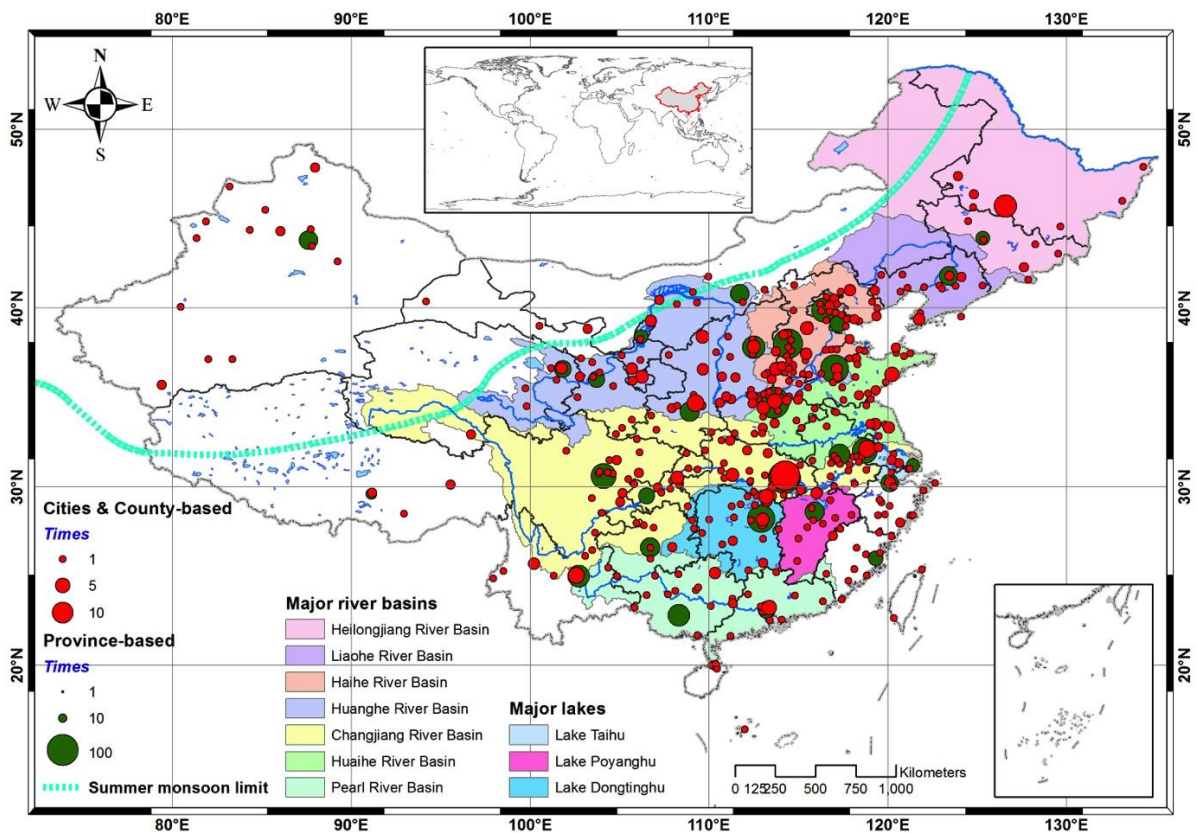


Figure 3 Geographic locations reported in water articles

265
266
267
268
269
270
271
272
273
274
275
276
277
278

Seven major river basins and seven major lakes in China were reported a total of 867 and 116 times, respectively, and accounted for 83.4% of all water-related reporting of 1178 water bodies. Among the seven river basins, the Yangtze River Basin (311 times), Yellow River Basin (214 times) and Huaihe River Basin (116 times) were reported much more frequently than other river basins. This happened because the Yangtze River Basin experienced several very severe floods in the period covered, and the *People's Daily* gave a lot of coverage on how the Communist Party and national governments organized relief for people.

The reporting of lakes was far less frequent than rivers. However, since the middle and late 1990s, particularly after a flood event in 1998, lakes drew more attention. Lakes Taihu, Dongtinghu and Poyanghu, which are located downstream in the Yangtze River Basin, were reported with increasing frequency.

279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297

Institutions and policies involved in water-related articles

There were 188 institutions cited in water-related articles of the *People's Daily* during 1946-2012, in a total of 395 articles. Government organizations at national level were reported most frequently among the 188 institutions. As may be expected, among the ministries, the Ministry of Water Resources (formerly the Ministry of Water Resources and Electric Power) had the highest reporting (76 times during the whole period), followed by the State Flood Control and Drought Relief Headquarters (42 times). The Ministry of Environmental Protection, which is responsible for water quality management, was also reported frequently (Table 2). The river basin committees, the second-level agencies in China's top-down water management system, were reported 45 times in total. The Yellow River Conservancy Commission, as the largest river basin management agency, was reported 22 times (Table 2). The local administrative departments for water resources were reported 66 times over the sampling period. The China Institute of Water Resources and Hydropower Research was the only research organization or university that was reported during the 69 year timeframe, and it was only reported once.

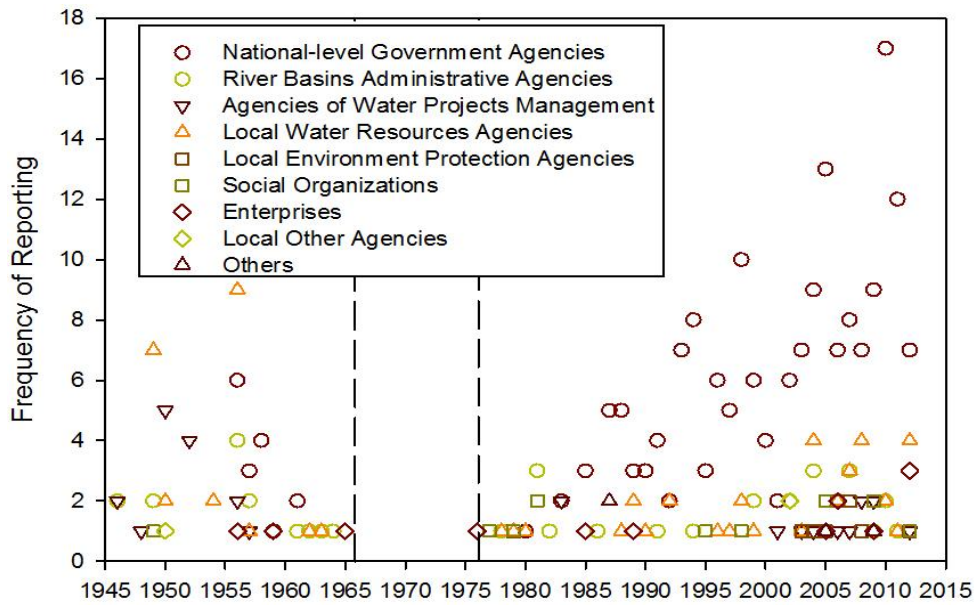
Table 2 Institutions involved in water-related articles

Institutes	Total reporting times
Ministry of Water Resources	76
State Flood Control and Drought Relief Headquarters	42
Yellow River Conservancy Committee	22
Ministry of Environmental Protection	19
Ministry of Agriculture	9
Yangtze River Conservancy Committee	7
Beijing Water Authority	7
Ministry of Finance	6

Note: only the organizations with more than 5 citations are listed.

298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313

Before 1966, only 64 organizations were reported 103 times in total. During this period, water engineering project organizations, local water resources agencies and national-level governments were the three major types of organizations that were reported frequently. During this period China built a large number of small and medium scale flood control engineering projects in order to control floods, and a large number of irrigation works to increase food supply. From 1966 to 1976, during the Chinese Cultural Revolution, no organizations were reported at all. After that, the reporting frequency of national level government agencies increased and local water resources agencies and river basin authorities were included. This is closely related to the promulgation and implementation of the Water Law in 1988, which marked that China had entered a new period of water governance with legislation and a series of water resources management reforms. After 2000, the construction of the South-to-North Water Transfer Project and Three Gorges Projects received more attention (Figure 4).



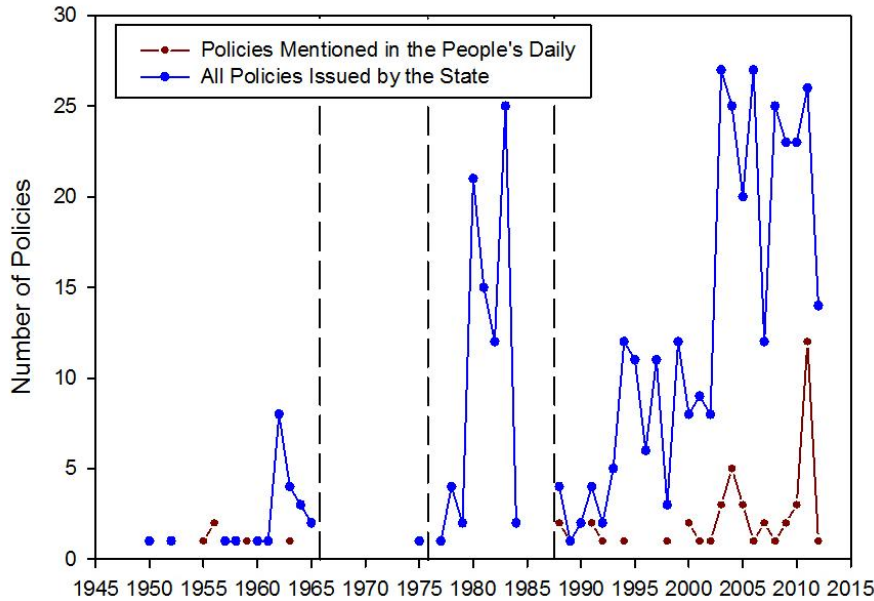
314
315 **Figure 4** Institutions covered in the water-related articles over year
316

317 There were 49 policies reported in the water-related articles of the *People's Daily* with
318 total reporting of 55 times during the sampling period. Among them, 29 were issued by the
319 national government and 20 were issued by provincial governments. No policy was reported
320 more than twice (Table 3). As one of the most important policies, *Opinions on Implementing*
321 *the Strictest Water Resources Management System*-the No. 1 Central Document of 2011 was
322 reported only twice.

323
324 **Table 3** Water resources management policies reported twice

Title	Date issued
Opinions on Implementing the Strictest Water Resources Management System	2011
The Eleventh Five-year Plan for National Environment Protection	2007
Plan on Intensive Harnessing and Development of the Yellow River	2002
Interim Measures on Compensation for Utilization of Flood Detention Areas	2000
Water and Soil Conservation Law of the People's Republic of China	1991
Water Law of the People's Republic of China	1988

325
326 The coverage of water management policies in water-related articles of the *People's Daily*
327 over the sampling period can be divided into 4 stages (Figure 5). Before 1966 the newspaper
328 mentioned a few water management policies concerning flood control and the development
329 of agriculture. It is not surprising that during the Cultural Revolution no policy was released
330 and correspondingly no policy was reported either. The third stage was from 1978 to 1987
331 when China started to implement reforms and opening-up. During this period the statistics for
332 water management policies showed sharp increases but there were no water management
333 policies mentioned in the newspaper. This might have happened because the news reporting
334 during this period was focused on the economic development as the priority. Since the Water
335 Law was issued in 1988 China accelerated water reforms and the laws and regulations related
336 to water management sharply increased, and they were reflected in the reporting frequency of
337 articles after that year.

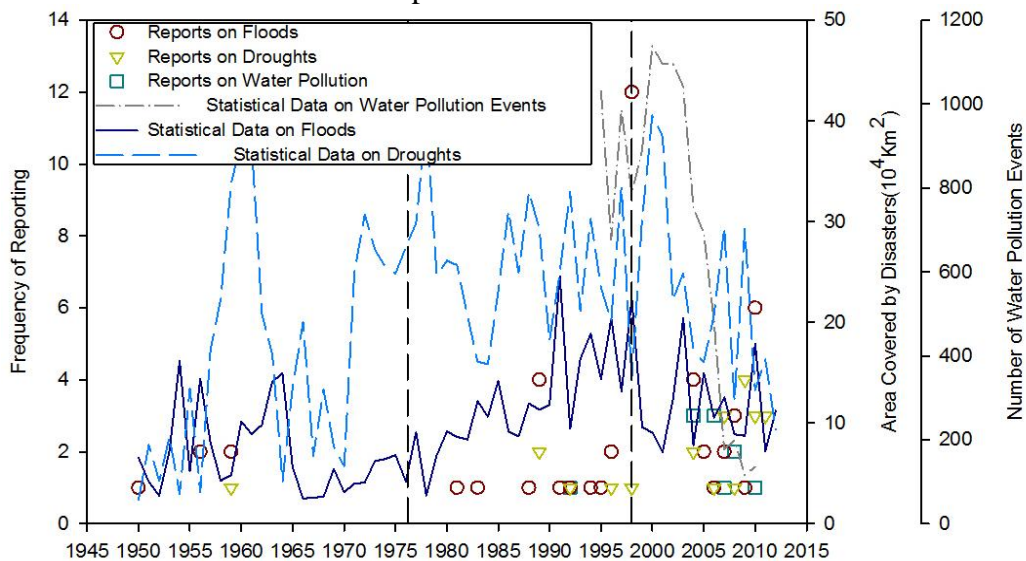


338
339 **Figure 5** Number of water policies covered in the water-related articles over year

340 Note: the data on the all policies issued by the State after 1983 (inclusive) were obtained from the official websites of the State Council
341 and all relevant ministries. The data on the all policies issued by the State before 1983 were obtained from Laws and Regulations on Water
342 Resources and Electric Power (Volumes 1-4) compiled by the Ministry of Water Resources in 1985.
343

344
345 **Major events reported in water-related articles**

346
347 The major events reported in water-related articles referred to drought, flood, and water
348 pollution events. Flooding events were reported 49 times over the sampled period, more
349 times than drought events (23 times). In the case of water pollution there was no reports until
350 the 1990s, after that it was reported 11 times, and it was reported more widely after 2000
351 (Figure 6). In flood years (such as 1956, 1991 and 1998) and drought years (such as 1959,
352 1992 and 2010), there were some reports of major events in the *People's Daily*. Due to
353 political and social reasons both data from official reports and news reporting of water
354 pollution were very sensitive in China, it is doubtful if either of them were closely related to
355 the facts in terms of actual number of pollution incidents.



356
357 **Figure 6** Water disasters covered in the water-related articles over the sampled years
358

359
360
361

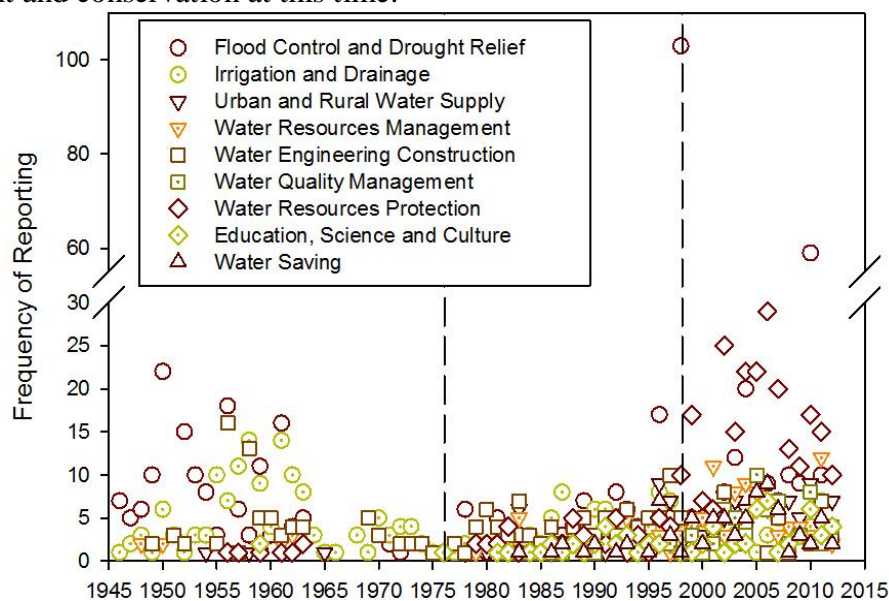
Note: the data on floods and droughts was obtained from Chinese Flood and Drought Bulletin in 2012 and data on water pollution incidents were obtained from the China Environment Statistical Yearbook (1996-2011)

362
363

Themes and tones of water-related articles

364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379

The themes of water articles in the newspaper evolved with time (Figure 7). Before and during the Cultural Revolution flood and drought relief and farm irrigation were two major themes, although they were reported much less frequently in the latter stage. During 1976 and 1998 there was a broader range of topics reported, which included urban and rural water supply, water resources management, water saving and water resources protection. This may reflect a period when China's economic development had a spurt of progress, urbanization increased, industrial and agricultural production improved significantly after the implementation of reforms and opening policies, so that water demand were higher than before. Urban and rural water supply themes in water-related articles became more frequent after the 1980s. Since the 1990s, some large water engineering projects, such as the Three Gorges project and South to North Water Transfer project began to be constructed, and the frequency of water engineering construction related articles also increased. After 1998 the themes related to the sustainable utilization of water resources, e.g. saving water, water resource protection and water quality management were significantly higher than any other theme after 2000 (Figure 7). This probably represents increased emphasis on resource management and conservation at this time.



380
381
382

Figure 7 Themes covered in the water-related articles over year

383
384
385
386
387
388
389
390
391

Among all water-related articles there were 676 that were economic development-driven and 304 articles that were environmental protection-driven, and 1046 in which neither were mentioned. The economic development-driven articles were distributed through the whole study period (Figure 8). The environmental protection-driven articles started from 1978, and they showed a significant growth trend after 1998 during which the annual reporting number exceeded the economic development-driven articles at most of times. This indicates that the conservation and sustainable use of water resources became primary concerns of water issues in China around the beginning of the new millennium.

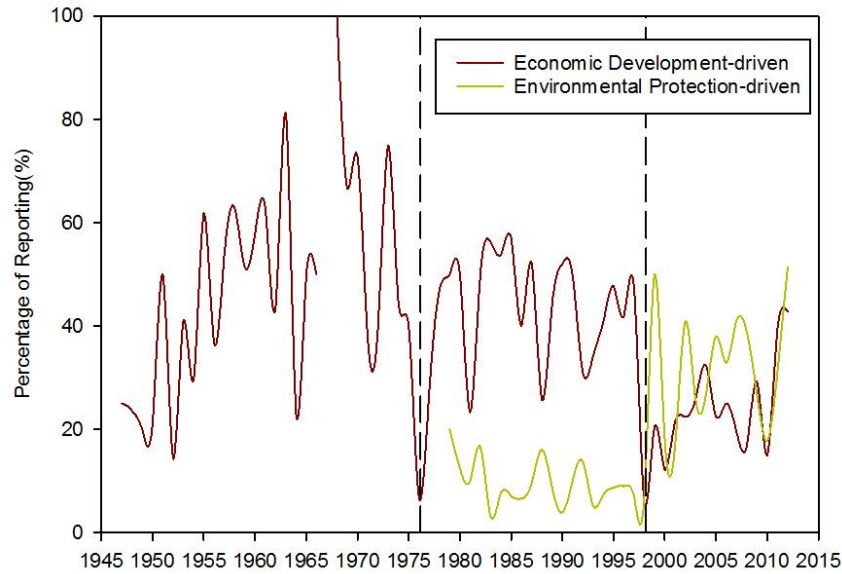


Figure 8 Economic development-driven tones and environmental protection-driven tones covered in the articles over year

DISCUSSION AND CONCLUSIONS

This paper represents an attempt to understand the evolution of newspaper coverage of water issues in China during a 67 year timeframe (1946-2012) by analyzing water-related articles in the newspaper *People's Daily* with a content analysis approach. Major research findings and their implications for practices and future research will be discussed in comparison with other studies on the media reporting of water issues, in particular Wei et al. (2015), a companion paper, which developed an understanding of the evolution of newspaper coverage of water issues in Australia over a 169 year timeframe with the same methodology applied to the *Sydney Morning Herald*. The similarities and differences will be analyzed and lessons from this study will be highlighted.

Water issues were reported in relatively important position in the newspaper in China and their number generally increased over time. Furthermore, about 70% of water-related articles were categorized as the news type which is the most important category of news media. In contrast, in Australia only 5 % of the *Sydney Morning Herald's* articles were on the front page and the number of articles on water issues did not show an increasing trend over time. The Chinese paper therefore reported water-related issues in more prominent positions than the Australian paper and their frequency increased during the period of content analysis.

In terms of geographic distribution the reporting of water issues was mainly concentrated in the middle and eastern regions of China where the precipitation is relatively high and the economy is relatively developed. Among the seven main river basins of the country, the Yangtze River Basin (311 times), the Yellow River Basin (214 times) and the Huaihe River Basin (116 times) were reported more frequently than the others. These results showed that there was no geographical bias of reporting around Beijing where the *People Daily* is published, reflecting national coverage by this paper. In Australia, Wei et al. (2015) concluded that there was a reporting bias in their study as a majority of the articles covered the Sydney region where the *Sydney Morning Herald* is published.

427 The water issues reported in China exhibited three stages of change: 1946-mid 1980s, mid
428 1980s to 1997 and 1998 to the present, with the primary concern of each stage being flood
429 and drought control and water for food, water for economic development, and water for
430 environmental sustainability, respectively. In general the changes over time reflect rapid
431 changes in the general economic development of China since 1946. In Australia, newspaper
432 attention on water issues water was firstly given to meeting demands of urban settlements and
433 then to the agricultural practices and industrial development (mining in particular), from
434 European settlement to the 1980s. The increased frequency of the reporting of the
435 degradation of the riparian environment, impairment of water quality and reduction of
436 biodiversity, reflects the intensification of the broad national reform debate for securing
437 environmental health since the 1990s.

438
439 Similar trends in reporting sustainability-related media agendas were shown in both the
440 Chinese and Australian newspapers. News about economic issues dominated the
441 water-related articles reported in the Australian newspaper until they were replaced by
442 articles that reflect rising environmental concerns in the community around 1994. In this
443 study 70% of articles in China's mainstream newspaper were economic development-oriented.
444 The economic development-driven articles fluctuated throughout the study period, however,
445 when compared to the percentage of reporting frequency, they showed a declining trend and
446 were replaced by increases in articles relating to environmental sustainability. This trend
447 emerged from 1978 and became dominant after 1998, which is only 4 years after the
448 transition occurred in Australia.

449
450 There were large differences in the reporting frequency of the institutions involved with
451 water (whose voices were being reported), related policies and themes (what was discussed)
452 and natural and artificial events (what were the situations) and the perspectives (the articles'
453 tones) during the three main stages we defined in China (1946-mid 1980s, mid 1980s to 1997
454 and 1998 to the present). Significant natural and social events triggered the transition between
455 these stages. These included the Cultural Revolution during 1966 to 1976, the 'Reform and
456 Opening-up' in 1978, the promulgation of the Water Law in 1988, the severe floods along the
457 Yangtze River in 1998, the severe droughts in South-West of China in 2010, and the
458 publication of the No. 1 Central Document on water reform in 2011. Our findings cast doubts
459 on the two main extreme interpretations on the societal transition on water issues by the
460 ecological realists and social-constructivists. Our findings support the realist assumption that
461 the transitions of stages were triggered by a range of factors, including biophysical pressure
462 (floods and droughts), political campaigns (the Cultural Revolution), macro-economic reform
463 (Reform and Opening-up), water institutional arrangement (the Water Law) and water
464 management reform (the No. 1 Central Document on water reform). A similar conclusion
465 was drawn by Wei et al. (2015) in Australia.

466
467 Floods and droughts were the key topics over the whole study period even though the
468 reported frequencies were much lower than the official statistics, as was also the case in
469 Australia (Wei et al. 2015). Droughts and flooding events are by nature considered as
470 obtrusive events that have dramatic impacts on public opinion and attitudes to water issues
471 (Soroka 2002; Hurlimann and Dolnicar 2012). As proposed in Wei et al. (2015), crisis as such
472 can stimulate significant policy and institutional changes toward sustainability, therefore
473 floods and droughts could be a decisive intervention or turning points for a societal transition
474 (Beddoe et al. 2008).

475
476 The water-related articles in the *People's Daily* clearly reflected China's top-down water

477 resources management system. At the national level, the Ministry of Water Resources, the
478 State Flood Control and Drought Relief Headquarters, and the Ministry of Environmental
479 Protection are three key government agencies in charge of water resources management, were
480 reported with the highest frequencies (76 times, 42 times and 19 times respectively). At the
481 river basin management level, due to historical, cultural and institutional factors, **each** river
482 basin **commission** has different administrative powers and play different roles in river basin
483 management. This situation was reflected in the news reporting. **The** Yangtze River Basin
484 was reported 311 times and the Yellow River Basin only 214 times. However, the Yellow
485 River Conservancy Committee was reported 22 times and the Yangtze Conservancy
486 Committee was only reported 7 times. At provincial and lower **government** levels, China has
487 34 provincial level governments, 333 city-level governments and 2856 county-level
488 governments, **and** only 384 of **these government agencies** were reported 572 times in total.
489 No reporting **of** grass-root individual persons or NGO organizations was found. Only one
490 research organization was reported once. It is well recognized that China quickened its
491 reform of democratization two decades ago, but **our** finding **that** the national-level
492 government agencies were reported in increasing numbers **over time** did not support this. No
493 “real” public opinions **from individuals or community-based organizations** were reported **on**
494 **water-related matters** during the study period. These findings **suggest** that bottom-up or
495 participatory water management **is not a priority for the mainstream** Chinese newspaper. **In**
496 **Australia, surprisingly, a similar pattern presented.** According to Wei et al. (2015), **government**
497 **agencies and water-related authorities overwhelmingly dominated the voices on water issues**
498 **in their 169 year reporting timeframe.** Other institutions including industry, research
499 organizations and individuals together were only reported in 5 % of the total number of
500 articles. Several factors could explain this finding. Large agencies concerned with water, e.g.
501 China Three Gorges Corporation, actively promote their activities and interests by producing
502 media releases that are likely to be adopted by news media, including newspapers. It is also
503 recognized that politicians try to influence the media agenda or the way controversial issues
504 are framed, which in turn can affect political power and government decisions (Bennett et al.
505 2008; Entman 2010). In addition, there might be a structural bias by journalists that considers
506 powerful actors in the news as the priority.

507

508 It is known that the media **can create perceived** reality and **set** the public agenda to both
509 reflect and influence public opinions on certain issues. The water issues reporting in the
510 *People’s Daily* fully reflected its functions of ‘guiding public opinion’ and ‘surveillance of the
511 environment’ (Lasswell 1948). A **good** example is **reporting during** the Cultural Revolution.
512 **when** the agenda setting of the *People’s Daily* also reflected the change of the government
513 laws, institutions and policies because of its identity **as** official media. **Other** examples
514 include the ‘Reform and Opening-up’ in 1978, the Water Law in 1988, and the No. 1 Central
515 Document on water reform in 2011. There were synergetic effects between water issues
516 reporting in the newspaper and water policy during the whole study period. Thus, the
517 *People’s Daily* is just a wind vane of Chinese **government** water policies **and** the mainstream
518 voice of Chinese government ideology and policies. **This reflects that** China is not a **western**
519 **style** democracy as only one political party manages and controls the government.

520

521 In summary, our research findings have presented how water issues were reported and
522 portrayed to the public in the unique case of China, and determined the change patterns in
523 water reporting over the years. **Considering the thematic heterogeneity of the media frames,**
524 **together with the politically and culturally diverse nature of water issues, the similarities and**
525 **differences between this study and other studies seem comprehensible.** Australia shares
526 similar water problems with China. This study, along with Wei et al. (2015)’s study in

527 Australia, provides valuable cases for understanding the interactions between public opinion
528 on water issues, biophysical conditions and policy changes. Important implications for
529 supporting transitions toward more sustainable water management include the need for
530 deeper, consistent, and systematic reporting on water issues rather than at sporadic intervals.
531 This would ensure that there is a high level of public environmental concern of how water
532 issues may impact quality of their life and the environment where they live. Therefore, there
533 is also a need to improve academic specialist and NGO's voices in newspapers to improve
534 significantly the dissemination of evidenced-based research findings on water sustainability
535 issues in order to create a better informed public and to stimulate behavior toward sustainable
536 water management. One limitation of this study is that only one Chinese newspaper was
537 studied although comparisons with our work in Australia were generally consistent. It would
538 be preferable if further research could be conducted to cover several newspapers to improve
539 the representativeness of newspaper reporting more generally, but few Chinese newspapers
540 have a more than 60 years' archive available.

541

542

543 **References**

- 544 Altaweel, M., and C. Bone. 2012. Applying content analysis for investigating the reporting of
545 water issues. *Computers, Environment and Urban systems* 36: 599-613.
- 546 An S., and K.K. Gower. 2009. How do the news media frame crises? A content analysis of
547 crisis news coverage. *Public Relations Review* 35 (2): 107-112.
- 548 Bennett, W.L., R.G. Lawrence, and S. Livingston. 2008. *When the press fails: Political power
549 and the news media from Iraq to Katrina*. London: University of Chicago Press.
- 550 Beddoe, R., R. Costanza, J. Farley, E. Garza, J. Kent, I. Kubiszewski, L. Martinez, T.
551 McCowen, K. Murphy, N. Myers, Z. Ogden, K. Stepleton, and J. Woodward. 2009.
552 Overcoming systemic roadblocks to sustainability: The evolutionary redesign of
553 worldviews, institutions, and technologies. *PNAS* 106(8): 2483-2489.
- 554 Cohen, B. 1963. *The press and foreign policy*. Princeton: Princeton University Press.
- 555 Downs, A. 1973. The political economy of improving our environment. In *Environmental
556 decay: Economic causes and remedies*, ed. J. S. Bain, 59-81. Boston: Little, Brown.
- 557 Entman, R.M. 2010. Media framing biases and political power: Explaining slant in news of
558 Campaign 2008. *Journalism* 11: 389-408.
- 559 Frantzeskaki, N. 2011. *Dynamics of Societal Transitions. Driving Forces & Feedback Loops*.
560 PhD Dissertation, TU Delft, The Netherlands.
- 561 Geels, F.W. 2011. The multi-level perspective on sustainability transitions: Responses to
562 seven criticisms. *Environmental Innovation and Societal Transitions* 1(1): 24-40.
- 563 Geels, F.W. 2010. Ontologies, socio-technical transitions (to sustainability), and the
564 multi-level perspective. *Research policy* 39(4): 495-510.
- 565 Hale, B.W. 2010. Using newspaper coverage analysis to evaluate public perception of
566 management in river-floodplain systems. *Environmental Management* 45: 1155-1163.
- 567 Hester, J.B., and E. Dougall. 2007. The efficiency of constructed week sampling for content
568 analysis of online news. *Journalism & Mass Communication Quarterly* 84: 811-824.
- 569 Hoffman, A.J. 1996. Trends in corporate environmentalism: The chemical and petroleum
570 industries, 1960-1993. *Society & Natural Resources* 9(1): 47-64.
- 571 Howland, D., M.L. Becker, and L.J. Prelli. 2006. Merging content analysis and the policy
572 sciences: A system to discern policyspecific trends from news media reports. *Policy
573 Sciences* 39: 205-231.
- 574 Hurlimann, A., and S. Dolnicar. 2012. Newspaper coverage of water issues in Australia.
575 *Water Research* 46: 6497-6507.
- 576 Joshi, A.D., D.A. Patel, and D.A. Holdford. 2011. Media coverage of off-label promotion: A

577 content analysis of US newspapers. *Research in Social and Administrative Pharmacy* 7:
578 257–271.

579 Kallis, G. 2011. Coevolution in water resource development the vicious cycle of water supply
580 and demand in Athens, Greece. *Ecological Economics* 69: 796-809.

581 Lasswell, H.D. 1948. The structure and function of communication in society. In *The*
582 *communication of ideas*, ed. L. Bryson, 37-51. New York: Harper & Brothers.

583 Loorbach, D., and J. Rotmans. 2006. Managing transitions for sustainable development. In
584 *Industrial transformation—disciplinary approaches towards transformation research*, ed.
585 A. J. Wiczorek and X. Olshoorn, 187-206. Dordrecht, the Netherlands: Kluwer Academic
586 Publishers.

587 Murphy, J.T., J. Ozik, N.T. Collier, M. Altaweel, R.B. Lammers, A. Kliskey, L. Alessa, D.
588 Cason, et al. 2014. Water relationships in the U.S. southwest: Characterizing water
589 management networks using natural language processing. *Water* 6: 1601–1641.

590 Norgaard, R.B., G. Kallis, and M. Kiparsky. 2009. Collectively engaging complex
591 socio-ecological systems: re-envisioning science, governance, and the California Delta.
592 *Environmental Science & Policy* 12: 644-652.

593 Pahl-Wostl, C. 2007. Transitions towards adaptive management of water facing climate and
594 global change. *Water Resource Management* 21: 49-62.

595 People’s Daily. 2015. *Creating brand-analysis on the advertising value of People’s Daily* (in
596 Chinese). Retrieved January 15, 2015 from <http://www.people.com.cn/GB/168602/169592/>

597 Rammel, C., S. Stagl, and H. Wilfing. 2007. Managing complex adaptive systems — a
598 co-evolutionary perspective on natural resource management. *Ecological Economics* 63:
599 9-21.

600 Riffe, D., S. Lacy, and F. Fico. 2005. *Analyzing media messages: Using quantitative content*
601 *analysis in research*. 2. Mahwah, NJ: Lawrence Erlbaum Associates.

602 Riffe, D., C.F. Aust, and S.R. Lacy. 1993. The effectiveness of random, consecutive day and
603 constructed week sampling in newspaper content analysis. *Journalism & Mass*
604 *Communication Quarterly* 70: 133–139.

605 Rotmans J., R. Kemp, and M. van Asselt. 2001. More evolution than revolution: Transition
606 management in public policy. *Foresight* 3(1): 17.

607 Rotmans, J., and R. Kemp. 2003. *Managing societal transitions: Dilemmas and uncertainties:*
608 *The Dutch energy case-study*. OECD.

609 Schmidt, A., A. Ivanova, and M.S. Schaffer. 2013. Media attention for climate change around
610 the world: A comparative analysis of newspaper coverage in 27 countries. *Global*
611 *Environmental Change* 23: 1233–1248.

612 Schoenfeld, A.C., R.F. Meier, and R.J. Griffin. 1979. Constructing a social problem: The
613 press and the environment. *Social Problems* 27(1): 38-61.

614 Scott, W.A. 1955. Reliability of content analysis: The case of nominal scale coding. *Public*
615 *Opinion Quarterly* 19: 321-325.

616 Sirmakessis S. 2004. *Text mining and its applications: Results of the NEMIS Launch*
617 *Conference (Studies in Fuzziness and Soft Computing, V. 138)*. Berlin ua: Springer.

618 Song Y.Y., and T.K. Chang. 2012. Selecting daily newspapers for content analysis in China.
619 *Journalism Studies* 13(3): 356-369.

620 Soroka, S.N. 2002. Issue Attributes and Agenda-Setting: Media, the Public, and Policymakers
621 in Canada. *International Journal of Public Opinion Research* 14(3): 264-285.

622 Tàbara, J.D., and A. Ilhan. 2008. Culture as trigger for sustainability transition in the water
623 domain: the case of the Spanish water policy and the Ebro river basin. *Regional*
624 *Environmental Change* 8(2): 59-71.

625 van der Brugge, R., J. Rotmans, and D. Loorbach. 2005. The transition in Dutch water

626 management. *Regional Environmental Change* 5(4): 164-176.
627 Wattenberg, M.P. 2008. *Is Voting for Young People?* New York: Pearson/Longman.
628 Weber, R.P. 1990. *Basic Content Analysis, 2nd ed.* Newbury Park, CA: Sage.
629 Wei, J., Y.P. Wei, A. Western, D. Skinner, and C. Lyle. 2015. Evolution of newspaper
630 coverage of water issues in Australia during 1843–2011. *AMBIO* 44(4): 319-331.

631 **Title:**

632 Evolution of China's water issues as framed in Chinese mainstream newspaper

633

634 **Authors:**

635 Yonglan Xiong^{1, 2}, Yongping Wei³, Zhiqiang Zhang², Jing Wei³

636 **Affiliations:**

637 1. College of Geography and Environment Science, Northwest Normal

638 University, Lanzhou 730000, China;

639 2. Lanzhou Centre for Literature and Information of the Chinese Academy of

640 Sciences, Lanzhou 730000, China;

641 3. Australia China Joint Research Centre on River Basin management, the

642 University of Melbourne, Parkville 3010, Australia;

643

644 **Corresponding Author:**

645 Yongping Wei

646 e-mail: ywei@unimelb.edu.au

647 Tel: +61 3 83449799

648 Fax: +61 3 8344 6215

649

650 **Acknowledgement**

651 Thanks to the Scientific Data Sharing Platform for Lake and Watershed for

652 providing the data of river basin boundary. This work was funded by the Natural
653 Science Foundation of China (Project No. 91125007 and 41401623), Youth
654 Innovation Promotion Association CAS (Project No: 2015381), the Australian
655 Research Council (DP120102917 and FT130100274), and the Commonwealth of
656 Australia under the Australia-China Science and Research Fund (Project No:
657 ACSRF800).

658
659

660 AUTHOR BIOGRAPHIES

661 Yonglan Xiong is an Associate Professor at the Lanzhou Centre for Literature
662 and Information of the Chinese Academy of Sciences, and a doctoral candidate
663 at College of Geography and Environment Science, Northwest Normal
664 University, China. Her research topic is to investigate the relationships between
665 cultural trigger for water catchment management and social policy.

666 Address: Lanzhou Centre for Literature and Information of the Chinese Academy
667 of Sciences, Lanzhou 730000, China

668 e-mail: xiongyl@llas.ac.cn

669

670 Yongping Wei (✉) is a Senior Research Fellow at the Australia China Centre
671 on River Basin Management, The University of Melbourne. She has been
672 recognized by the Australian Research Council with Future Fellowship
673 (2014–2018) for her academic contribution in river basin management. She has
674 multi-disciplinary research interest in natural resource management and water

675 resources engineering.

676 Address: The Department of Infrastructure Engineering, The University
677 of Melbourne, Parkville 3010, Australia.

678 e-mail: ywei@unimelb.edu.au

679

680 Zhiqiang Zhang is a Professor at the Lanzhou Centre for Literature and
681 Information of the Chinese Academy of Sciences. His academic interests
682 include disciplinary development analysis of earth sciences and resources and
683 environmental sciences, ecological economics and science policy.

684 Address: Lanzhou Centre for Literature and Information of the Chinese Academy
685 of Sciences, Lanzhou 730000, China

686 e-mail: zhangzq@lzb.ac.cn

687

688 Jing Wei is a doctoral candidate at The University of Melbourne, Department of
689 Infrastructure Engineering. Her research topic is to investigate the cultural
690 trigger for water catchment management against ecological degradation in
691 Australian catchments.

692 Address: The Department of Infrastructure Engineering, The University
693 of Melbourne, Parkville 3010, Australia.

694 e-mail: jingwei@student.unimelb.edu.au

695

696



Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:

Xiong, Y; Wei, Y; Zhang, Z; Wei, J

Title:

Evolution of China's water issues as framed in Chinese mainstream newspaper

Date:

2016-03-01

Citation:

Xiong, Y., Wei, Y., Zhang, Z. & Wei, J. (2016). Evolution of China's water issues as framed in Chinese mainstream newspaper. *AMBIO*, 45 (2), pp.241-253.

<https://doi.org/10.1007/s13280-015-0716-y>.

Persistent Link:

<http://hdl.handle.net/11343/283065>

File Description:

Accepted version