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# LIQUID CHALLENGES: CONTESTED WATER IN CENTRAL ASIA

by Christine Bichsel\*

## INTRODUCTION

With the disintegration of the Soviet Union in 1991, the two large river systems of the Syr Darya and the Amu Darya were no longer situated within one state, but instead transected the borders of five newly independent states: Kyrgyzstan, Kazakhstan, Uzbekistan, Tajikistan, and Turkmenistan.<sup>1</sup> In the discourse of hydro politics, this was perceived as a geographical misfit between water and state boundaries, raising the potential for “water wars.”<sup>2</sup> Water is a scarce resource that may be contended for by states and identity groups because it is essential for physical survival and basic for most human activities.<sup>3</sup> Indeed, water plays a crucial role in all five states of post-Soviet Central Asia.<sup>4</sup> The existing arid climate in the region limits the possibility for rain-fed agriculture and necessitates the supply of additional water.<sup>5</sup>

Irrigation zones have been mainly developed along the two major rivers, the Syr Darya and the Amu Darya, which drain into the Aral Sea.<sup>6</sup> One of the most hospitable areas to irrigated agriculture in Central Asia is the Ferghana Valley, an almond-shaped intramontane basin surrounded by extensive mountain ranges.<sup>7</sup> United as part of the Soviet Union until 1991, the Ferghana Valley is presently divided among the three successor states Uzbekistan, Kyrgyzstan and Tajikistan.<sup>8</sup> It accounts for forty-five percent of the total irrigated area within the Syr Darya basin.<sup>9</sup> However, water in Central Asia is not only used for irrigated agriculture, but also for energy production.<sup>10</sup>

This article discusses conflicting claims to water in the Syr Darya basin with a specific focus on the Ferghana Valley. It traces the emergence of these claims back to Soviet water management and irrigation and explores the contentious nature of water both at the regional as well as sub-state level. It equally assesses international efforts to mitigate the potential for violence and degradation of the environment. This article also makes recommendations in three fields. First, it stresses the continued need to address water conflicts and related issues in Central Asia not solely in the technical, but also the social, economic, and political contexts. Secondly, it emphasizes the links between the work of border commissions and water conflicts, particularly those in the Ferghana Valley. Thirdly, it proposes a rethinking

of blueprint approaches to water management in Central Asia, and to allow for more space for alternative conceptualizations. The article concludes with the opinion that conflicts over water in Central Asia may be driven more by particular interests of specific domestic actors in each country than by non-cooperative inter-state relations.

**Map 1:** The Aral Sea Basin, *courtesy of International Water Management Institute*



## THE SYR DARYA BASIN AND THE FERGHANA VALLEY

The irrigation network in Soviet Central Asia received particularly large financial and technological investments after World War II.<sup>11</sup> This entailed not only extending and widening the major canals, but also expanding the irrigated area upwards and outwards from the plains to the foothills.<sup>12</sup> Built in the 1970s on the territory of Kyrgyzstan, the Toktogul reservoir was designed to support this expansion and provide seasonal and multi-year water storage in order to increase the availability

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of water for irrigation in the Uzbek and Kazakh republics, as well as to regulate the distribution of water downstream in the Syr Darya River basin.<sup>13</sup> As was common with reservoirs in the USSR, a hydroelectric plant was constructed at the same time, enabling the Toktogul reservoir to generate hydropower in conjunction with its water management function.<sup>14</sup>

The Soviet Union, like the Russian Empire before it, encouraged cotton production in Central Asia to satisfy the demand of the domestic textile industry.<sup>15</sup> The Soviet Union therefore fervently pressed this water-intensive crop on the agriculturally and ecologically suitable lowlands of the Uzbek and Tajik republics, as well as further downstream in the Kazakh republic.<sup>16</sup> There, the Soviet Union developed irrigation and drainage projects primarily to increase cotton production in these lowland republics, which facilitated the rise in cotton production from 4.3 million tons in 1960 to approximately 10 to 11 tons in 1990.<sup>17</sup> With cotton being a strategic priority, Soviet leaders designated the lion's share of the Syr Darya river's flow to cotton production in the lowlands.<sup>18</sup> Conversely, Soviet planners resolved that the strategic priority in the Kyrgyz republic was animal husbandry with a focus on meat and milk products, as well as growing rain-fed fodder.<sup>19</sup> The energy needs of the Kyrgyz Republic were met by importing electricity and/or natural gas, coal, and oil for its thermal power plants from the downstream Central Asian and other Soviet republics.<sup>20</sup> Thanks to these arrangements, the Toktogul reservoir, as part of a highly integrated network, became the key element in large scale cotton growing in Uzbekistan and Tajikistan.<sup>21</sup>

With the disintegration of the Soviet Union in 1991, the formerly integrated scheme of economic management collapsed.<sup>22</sup> Each of the five newly-independent Central Asian states was left to restructure the previously centralized water management system.<sup>23</sup> The Soviet Union left behind a highly integrated network of large irrigation canals and reservoirs, which was parceled out among its successor states.<sup>24</sup> This sudden transition meant that Kyrgyzstan, Tajikistan, Uzbekistan, and Kazakhstan were now individually responsible for managing the Syr Darya's water.<sup>25</sup> Moreover, these countries had to face the environmental consequences of Soviet irrigation practices.<sup>26</sup> During the 1970s it became apparent that the massive Soviet investments had not increased the efficiency of water use in Central Asia.<sup>27</sup> Rather, infrastructure problems actually led to huge water losses and inappropriate irrigation practices caused excessive application of water to the fields.<sup>28</sup> These problems culminated in the well-publicized disaster of the Aral Sea, which suffered decrease in water levels, substantial pollution, and increased salinity as a result of heavy water diversion for irrigation and poor water management policies.<sup>29</sup> Finally, although ample funds had been devoted to the construction of an irrigation infrastructure, little was spent on maintaining it.<sup>30</sup> Thus, by the early 1990s when these countries became independent large parts of the irrigation networks in Central Asia were already in need of repair.<sup>31</sup>

Accordingly, independence necessitated the subsequent establishment of new water management organizations, at both a domestic and inter-state level.<sup>32</sup> Each country established its own ministries and departments to supervise water resources.<sup>33</sup>

These new, individualized ministries retained many of the Soviet organizational structures, yet faced drastically reduced funding.<sup>34</sup> The resulting water management organizations suffered from declining salary pools, shrunken operating budgets, and little money for equipment.<sup>35</sup> These difficulties, along with concerns over the efficiency of water usage, prompted the new states to introduce cost recovery measures, and shift the ownership of tertiary irrigation infrastructures to local water users as a way to increase their rights and responsibilities.<sup>36</sup>

The end of the centralized Soviet system of water management also necessitated new agreements among the new Central Asian states to regulate the Syr Darya and Amu Darya Rivers.<sup>37</sup> The Almaty Agreement of 1992 established the Interstate Commission for Water Coordination ("ICWC") as the highest decision-making body for all matters pertaining to the regulation, efficient use, and protection of interstate watercourses and bodies of water in Central Asia.<sup>38</sup> The ICWC consists of leading water officials from each of the five countries, who met several times annually to set allocations and quotas as well as resolve disputes.<sup>39</sup> From this commission a number of additional agreements emerged, some of them pertaining to all Central Asia and others to specific rivers.<sup>40</sup> On the Syr Darya River, annual agreements were reached in 1995 and subsequent years among riparian states concerning the allocation of water and energy.<sup>41</sup> In 1998, Kyrgyzstan, Kazakhstan and Uzbekistan concluded a watercourse-specific agreement on the use of the water and energy resources of the Syr Darya River, thus folding earlier annual agreements into the new Syr Darya Framework Agreement.<sup>42</sup> Tajikistan joined this agreement in 1999.<sup>43</sup> Thus, while the countries retained national control over crops, industrial goods, and electric power generated by their use, they also worked with one another to manage available water resources.<sup>44</sup>

### CONTESTED LINKS BETWEEN WATER, ENERGY AND POLITICAL INDEPENDENCE

Neither the processes of domestic reform nor inter-state negotiations have been smooth or predictable as disputes over how to distribute shared water resources have arisen. The first major conflict regarding the seasonal distribution of water across the Ferghana Valley involves the operation of the Toktogul reservoir and hydroelectric plant.<sup>45</sup> The disintegration of the Soviet Union placed great stress on the existing system of inter-republican compensation for water and energy.<sup>46</sup> The newly independent downstream countries experienced difficulties consistently providing cheap gas for Kyrganstan, and ultimately raised prices.<sup>47</sup> Unable to purchase enough gas to generate its thermal power plants, Kyrgyzstan experienced chronic electrical outages during the winter, and in the early 1990s began to release more water from the Toktogul reservoir during that season to drive its hydroelectric generators.<sup>48</sup> But by providing for its own heating and lighting needs in winter, Kyrgyzstan reduces the quantity of water available to downstream Uzbekistan for irrigating its sector of the Ferghana Valley in the spring and summer.<sup>49</sup> And since a limited quantity of water can be retained in facilities such as the Kairakkum reservoir, Kyrgyzstan's release of water in the

wintertime have repeatedly flooded these downstream areas.<sup>50</sup> Uzbekistan often complains about the damage caused by winter flooding, demanding that water should be released mainly in summer so as to prevent flooding and sustain irrigated crops.<sup>51</sup>

A second dispute concerns the economic value of water provided across national borders. Since its independence, Kyrgyzstan has been neither willing nor able to assume the total financial burden of operating and maintaining the Toktogul dam and hydroelectric station nor willing to take actions to regulate the flow of water into the Naryn River and, accordingly, the flow into the Syr Darya.<sup>52</sup> Kyrgyzstan therefore seeks compensation from the downstream countries.<sup>53</sup> The annual cost to Kyrgyzstan of maintaining the Toktogul reservoir and its related infrastructure amounts to an estimated \$15 to \$27 million.<sup>54</sup> Until 2002, however, Uzbekistan and Kazakhstan did not contribute to the cost of maintaining and operating this facility.<sup>55</sup> Rising gas prices and the shift to a more market-oriented economy have prompted Kyrgyzstan's lawmakers to re-evaluate the value of water as a resource.<sup>56</sup> They argue that the Syr Darya waters flowing from Kyrgyzstan bring considerable economic benefit to the downstream countries via irrigated agriculture.<sup>57</sup> Therefore, they seek to place a specific value or price on water and to charge its users for what they receive from Kyrgyzstan.<sup>58</sup> Uzbekistan has, to date, been critical of this idea, questioning whether any country can actually own water and whether the water supply should be treated as an economic commodity.<sup>59</sup> Moreover, it asserts that because Kyrgyzstan provides no "value added" to the water flowing from its territory, it is hardly justified in asking for financial compensation.<sup>60</sup>

A third point of contention concerns the apportionment of water from the Syr Darya River and the quantity to which the respective riparian countries are entitled. Kyrgyzstan contests the old Soviet inter-republican quotas, which designated the lion's share of the Syr Darya's water to Uzbekistan and Kazakhstan.<sup>61</sup> With the 1992 Almaty Agreement on Water Resources, the new states confirmed that they would continue to observe the existing quotas for the time being, but did not detail the possibility of later changes.<sup>62</sup> The Agreement assigned 51.7 percent of the river flow to Uzbekistan, 38.1 percent to Kazakhstan, 9.2 percent to Tajikistan and only 1 percent to Kyrgyzstan.<sup>63</sup> The Kyrgyz claim is that this arrangement effectively barred them from developing irrigated agriculture during the Soviet period and denied them the economic benefit that would have come from development.<sup>64</sup> Kyrgyzstan, therefore, now seeks to correct what it sees as a historical injustice by claiming enough water to develop self-sustaining and market-based irrigated agriculture.<sup>65</sup> However, this runs in direct conflict with plans by Uzbekistan, Kazakhstan and Tajikistan, all of which seek to expand and modernize their own irrigated agriculture.<sup>66</sup>

At present, the outlined disagreements have resulted in plans to build new dams and to deal with the accompanying or resulting controversies. Among many smaller dam building projects in Central Asia, Kyrgyzstan and Tajikistan are each attempting to resume the construction of large reservoirs designed in the 1960s and 1970s and partly constructed in the 1980s.<sup>67</sup> In

Kyrgyzstan, the two Kambar-Ata dam structures are planned upstream of the Toktogul reservoir on the Naryn River.<sup>68</sup> These dams would allow electricity production during winter, while saving water in the Toktogul reservoir for downstream irrigation purposes in the summer.<sup>69</sup> Moreover, since the necessary grid is already in place, the hydropower complex could generate surplus electricity for exportation.<sup>70</sup> However, there are doubts about the financial viability and environmental impacts of the project, one being that climate change-induced glacial melt and projected reduced water flow could render the structure obsolete within a generation.<sup>71</sup> Kambar-Ata I and II are estimated to cost around \$3 billion, a significant investment which Kyrgyzstan is unlikely to assume.<sup>72</sup> So far, possible investors, including Russia, have been hesitant to invest.<sup>73</sup> Questions of political stability aside, this may also be due to Uzbekistan's firm opposition to the project, objecting, among other issues, to the increased control Kyrgyzstan would acquire over the Syr Darya River flow.<sup>74</sup>

The Rogun dam in Tajikistan is a similar project with comparable goals to regulate water usage and release of the Amu Darya River.<sup>75</sup> Its original purpose was to guarantee sufficient water supply during water-scarce years for users in the Amu Darya basin, an area that suffers from a greater lack of regulation than the Syr Darya River.<sup>76</sup> The Soviets never completed the project due to the USSR's collapse that delayed construction in 1992 but if completed, the large hydropower plant and enormous water reservoir to be situated on the Vaksh River, a tributary of the Amu Darya River, will provide yearly water runoff regulation of the Amu Darya.<sup>77</sup> This goal is aided by the fact that the Rogun River is not followed by a downstream reservoir, which would likely affect the flow of the Amu Darya directly.<sup>78</sup> However, the Rogun Dam has significant hurdles to overcome before it can become a reality as the huge financial investment needed to resume and complete the construction has not yet been secured.<sup>79</sup> Once operational, Rogun is expected to cover as much as eighty percent of Tajikistan's average energy consumption and even offers opportunities for exporting electricity.<sup>80</sup> However, Uzbekistan has raised opposition toward the dam, listing concerns about reduced downstream water availability and dam safety.<sup>81</sup> Downstream countries are particularly worried about water availability during the one to two decades in which the reservoir would need to be filled.<sup>82</sup> Moreover, downstream nations and communities stress the future risks of the dam, as Rogun is situated in a seismically active area near a geological fault line.<sup>83</sup> A potentially sudden outflow of such a large scale could have disastrous consequences for downstream riparian zones.<sup>84</sup>

## INTER-GROUP CONFLICTS OVER WATER AND LAND

Thus far, the focus of disputes over water and energy has been among the successor states following the disintegration of the Soviet Union. However, no less serious tensions over water can arise *within* states.<sup>85</sup> With regard to conflicts over water, Eric Sievers, a Harvard University Russian and Eurasian scholar, writes that, "As the Syr Darya basin contains the Ferghana Valley, which is the most sensitive part of modern Central Asia in terms of ethnic violence, it presents a special case of conflict."<sup>86</sup> He

suggests that water scarcity and strained inter-ethnic relations could lead to violent conflict.<sup>87</sup> Indeed, many water users have faced declining access to water and greater uncertainties over its delivery after independence.<sup>88</sup> The changing seasonal patterns of water distribution and the effects of the inefficient and dilapidated infrastructure have negatively affected the situation.<sup>89</sup> Moreover, as the population continues to grow, there will be a further increase of pressure on water, land, and other natural resources.<sup>90</sup> Finally, as Sievers suggests, parts of the Ferghana Valley experienced a rapid social and economic decline following independence, which, if accelerated, could spur violence among a population overwhelmingly dependent on irrigated agriculture.<sup>91</sup>

Conflicts over water distribution are a frequent occurrence in the irrigated sections of the Ferghana Valley.<sup>92</sup> On the southern side of the valley, tensions tend to emerge in springtime when the beginning of the agricultural season brings a high water demand but the flow of the glacier-fed rivers has not yet filled irrigation canals to meet that demand.<sup>93</sup> Since most of the Ferghana Valley irrigation systems are gravity-operated, nearly all conflicts occur between upstream and downstream users.<sup>94</sup> A more erratic post-independence water supply has accentuated differences in access to water between upstream and downstream users and has increased competition for water during the springtime.<sup>95</sup> As a result, conflict parties form along territorial or residential affiliation rather than ethnic or kinship lines, although these categories frequently overlap.<sup>96</sup>

Water sources are contested particularly when rivers or canals transect the new international borders and are thus subject to inter-state agreements.<sup>97</sup> In the southern part of the Ferghana Valley this has entailed revising the allocation of water from several rivers and springs.<sup>98</sup> For example, during the Soviet period sixty-nine percent of the Shakhimardan Sai River's flow was allocated to the Uzbek Socialist Soviet Republic SSR, as compared with twenty-one percent for the Kyrgyz SSR (plus ten percent "water losses").<sup>99</sup> After the disintegration of the Soviet Union, Kyrgyzstan claimed, and sometimes simply appropriated, more water for itself.<sup>100</sup> Finally, in 2001 the Departments of Water Resources in Kyrgyzstan and Uzbekistan agreed that the water of the river should be divided equally between them.<sup>101</sup> Similar claims have been made on other rivers and sources, with several of them ending in allocation agreements.<sup>102</sup> These changed allocations that benefit upstream users have left downstream users discontent over their reduced water supply.<sup>103</sup> It is tempting to attribute these conflicts to the inevitable disputes arising out of new inter-state borders, however, it is at least as valid to suggest that they should be understood as the fallout from long-term economic shifts that are occurring in the region, the character and final dimensions of which are not yet fully evident.

As a general rule, Uzbek and Tajik groups in the Ferghana plains have a much longer history of agricultural production and sedentary lifestyles than the Kyrgyz, most of whom practiced animal husbandry and pursued a nomadic or transhumant existence in the foothills and premontane zones.<sup>104</sup> However, without clear-cut boundaries between them, there were constant

interactions between these modes of production and lifestyle.<sup>105</sup> But with the 1924 Soviet national-territorial delimitation, these socio-economic distinctions became territorialized.<sup>106</sup> They served as a basis for establishing the political-administrative divisions of the Ferghana Valley in the Uzbek, Tajik, and Kyrgyz SSRs.<sup>107</sup> The borderlines of the Ferghana Valley represented not only the territory of newly established Soviet nationalities, but to some extent follow the territorial distinction between different socio-economic practices such as irrigated agriculture and animal husbandry.<sup>108</sup>

Initially, Soviet regional economic specialization enhanced these territorialized socio-economic distinctions. For example, specialization fostered irrigated agriculture in the form of cotton production in the Uzbek SSR and animal husbandry in the form of meat and milk production in the Kyrgyz SSR.<sup>109</sup> Later, however, Soviet actions undermined specialization. The effort to relocate and permanently resettle nomadic populations as well as the expansion of irrigated agriculture zones into the foothills had precisely this effect.<sup>110</sup> With independence, the disintegration of the big state farms that produced meat and milk in the Kyrgyz sector, and the subsequent privatization of land, led many Kyrgyz to turn to private agriculture for their livelihood.<sup>111</sup> Today, Kyrgyz, Uzbeks, and Tajiks in the foothills practice both animal husbandry and agriculture.<sup>112</sup> This has had the effect of further increasing the demand for both land and water in the foothills of the Ferghana Valley.<sup>113</sup>

This shift in resettlement created new claims for water and land in the foothills of the Ferghana Valley, with the competing interests drawn along geographic zones, economic classes, and ethnic distinctions.<sup>114</sup> Thus, conflicts over water and land are also driven by territorial claims to the Ferghana Valley.<sup>115</sup> Although the current de facto borderline is unlikely to undergo major changes resulting from delimitation, many areas on the border are still contested among the three countries.<sup>116</sup> Ultimately, the form of land use and the identities of the people using a specific section may influence decisions on the borderline.<sup>117</sup> A consequence of national-territorial delimitation is conflicting territorial claims among the new countries.<sup>118</sup> These tensions tend to be especially concentrated in the irrigation systems in the foothills.<sup>119</sup> While such claims have existed throughout the Soviet period, they acquired a new dimension with the post-independence nation-building processes.<sup>120</sup>

## INTERNATIONAL INVOLVEMENT

Immediately after the Central Asian countries gained their independence in 1991, a large number of international aid agencies rushed into the region with projects and funding.<sup>121</sup> A prime concern of early international engagement was to avoid violent conflict among new states over water and to instead seek more cooperative modes of engagement.<sup>122</sup> A further concern was the shrinking of the Aral Sea and its adverse impact on the people and the environment.<sup>123</sup> With a growing emphasis on agriculture, an increased need for irrigation and a wasteful water distribution infrastructure caused<sup>124</sup> the water levels in the Aral Sea to drop between thirteen and eighteen meters since 1960.<sup>125</sup> Combined

with salinity levels eight times higher than they were in 1960 and over 400,000 kilometers of land lost to heavy pollution, the Aral Sea garnered much attention.<sup>126</sup> Efforts were geared toward mitigating the disaster as well as protecting the environment for the future.<sup>127</sup> This meant reducing the draw of water for agriculture from the Amu Darya and Syr Darya Rivers by rehabilitating infrastructure and instituting water-saving irrigation practices.<sup>128</sup> It also meant finding more efficient means of using water, including the institution of some sort of pricing mechanism.<sup>129</sup> Finally, international institutions criticized Soviet top-down approaches that had reduced farmers—or farm workers, as it were—to the status of passive implementers of decisions rather than entrusting them with responsibility for their own water use.<sup>130</sup> Instead, international groups opted for decentralization in water management and supported the granting of a high degree of self-governance to water users.<sup>131</sup>

Efforts to rectify the Aral Sea environmental disaster led directly to the formulation of inter-state initiatives for the improvement of water management in Central Asia as a whole.<sup>132</sup> The well-publicized disaster generated large funds and a multitude of projects from multilateral agencies, bilateral donors, and private foundations.<sup>133</sup> Spearheading these projects from the outset were the World Bank, the United Nations Development Programme (“UNDP”), the European Union (“EU”), and the United States Agency for International Development (“USAID”).<sup>134</sup> To different degrees, each of these organizations conducted scientific assessments, produced management plans, initiated conservation schemes, and held inter-state negotiations to improve the water regulation and ecological condition of the Aral Sea.<sup>135</sup>

Opinions differ on what all this work and funding actually accomplished.<sup>136</sup> Several agreements were reached on the management of water in the Syr Darya basin and the institutions established to implement them.<sup>137</sup> However, the actual allocations of water remain hostage to yearly barter agreements among the states.<sup>138</sup> Moreover, while the ecological condition of the Aral Sea region has been improved, it remains unlikely that this body of water will ever be restored to its pre-1960s level.<sup>139</sup> Among the many explanations for these outcomes, two warrant thorough consideration. One is that nearly all the inter-state negotiations sponsored by international agencies focused on the nexus of water and energy, but devoted insufficient attention to agriculture.<sup>140</sup> As a result, parties ignored environmental issues in the Syr Darya basin that were caused by water-intensive production and other critical agricultural policies.<sup>141</sup> Second, many of the international funders and agencies were not organized enough to assure substantial outcomes, while the local actors with whom they interacted lacked commitment to the projects and offered only hollow promises.<sup>142</sup>

Additionally, international involvement with water management in Central Asia has focused on promoting reform along the lines of Integrated Water Resource Management (“IWRM”), usually coupled with the rehabilitation of infrastructure.<sup>143</sup> In the Ferghana Valley, for example, the Swiss Agency for Development and Cooperation has run an IWRM project in cooperation

with the ICWC since 2001.<sup>144</sup> The aim of the project was to improve and reorganize the institutional arrangements for water management.<sup>145</sup> This included the restructuring of water management on the basis of hydrological rather than administrative boundaries, and increasing farmers’ participation in decision-making.<sup>146</sup> The project was joined by an effort towards Canal Automation, which would automate the measurement of water flows and the transmission of data.<sup>147</sup> More generally, international funders and organizations have been involved in decentralizing irrigation management along the lines of IWRM have established Water User Associations (“WUAs”). Major donor organizations promoting this work include the World Bank and Asian Development Bank in Kyrgyzstan, USAID in Uzbekistan and Kazakhstan, and the World Bank in Tajikistan.<sup>148</sup>

Irrigation reform based on IWRM principles altered the structure of water management in Central Asia. For example, International donors have established a large number of WUAs and introduced water service fees in Central Asia.<sup>149</sup> Considerable progress has recently been made to actually collect water fees, a process which was initially under-enforced.<sup>150</sup> Nonetheless, shortcomings remain.<sup>151</sup> WUAs usually enjoy little legitimacy in the irrigation communities in which they operate, exert limited influence on the actual distribution of water compared to informal authorities, and are frequently misunderstood as an arm of the state instead of representatives of local communities.<sup>152</sup> Yet it remains unclear who is to blame for these shortcomings. Dr. Jenniver Sehring, a policy associate at Ecologic Institute, has analyzed the irrigation reforms in Kyrgyzstan and Tajikistan, finding that WUAs themselves must bear responsibility for their modest impact on the distribution of water.<sup>153</sup> Thus, the WUAs’ failures stem from their faulty implementation.

IWRM is a prescriptive concept predicated on the belief that democratic governance is good governance.<sup>154</sup> IWRM is based on a market economy and democratic governance inspired by neo-liberal thinking and assumes that the conditions for such governance are already in place.<sup>155</sup> As a consequence, IWRM is “politically blind” to the actual political economy and power relations which exist in the Ferghana Valley, especially in Tajikistan and Uzbekistan.<sup>156</sup> It is questionable whether the IWRM goals of economic decentralization, self-government, and empowerment of water users can ever be achieved within strongly centralized governance systems.

At present, another major organization in Central Asian water relations is the bilateral donor Deutsche Gesellschaft für Internationale Zusammenarbeit (“GIZ”).<sup>157</sup> GIZ is commissioned by the German Federal Foreign Office to run the program “Transboundary Water Management in Central Asia” during the period of 2009-2011, targeting all five countries of the region.<sup>158</sup> The program aims to enhance the expertise and capacity of supra-state water management institutions and the International Fund for the Aral Sea (“IFAS”).<sup>159</sup> An additional focus is on the improvement of management by river basin organizations situated on selected cross-border rivers.<sup>160</sup> GIZ approaches these issues with the advisory support of experts, the training of personnel, and the creation and facilitation of forums to foster

interdisciplinary and cross-regional exchange.<sup>161</sup> GIZ also provides funds for technical equipment, refurbishment of irrigation infrastructure, demonstration facilities, and small hydroelectric plants.<sup>162</sup>

### POLICY RECOMMENDATIONS

Irrigated agriculture is likely to continue to play a major role in Central Asia, particularly in the Ferghana Valley.<sup>163</sup> It remains the source of people's livelihoods and the backbone of the economies of Uzbekistan, Tajikistan, and of Kyrgyzstan, especially because of the water-energy nexus.<sup>164</sup> Desertification of the Aral Sea basin remains a critical issue affecting all Central Asian countries.<sup>165</sup> Although largely a result of poor Soviet management, like water diversion schemes, the Aral Sea basin remains a major environmental concern and an area of political contention.<sup>166</sup> In the coming years, the possible restoration of infrastructure and the correction of existing flaws remain a daunting challenge due to the social and economic concerns.<sup>167</sup> Constructing and maintaining a viable water management infrastructure will be a critical step towards mitigating the tension over water as the expansion of agriculture further forces nations to secure their own water needs even at the expense of a neighboring country.<sup>168</sup> Estimates from scholars Dukhovny and Sokolov show the cost of such repairs throughout the Aral Sea basin would reach \$16 billion.<sup>169</sup> Still, this figure does not include the cost of applying water-saving technologies or adding new hydropower complexes.<sup>170</sup>

Identifying sources of such large investments will be a major challenge that cannot be borne by the Central Asian states alone.<sup>171</sup> Moreover, while the updating of irrigation systems is seemingly a matter of technical considerations, the physical, economic, and legal configuration of such systems are also shaped by the character of property rights and user relations.<sup>172</sup> Any effective step towards improving and expanding irrigation systems in the Ferghana Valley must address the social and political challenges relating to irrigated agriculture. Decisions on what form of irrigated agriculture are economically viable, environmentally sustainable, and ethically acceptable in the Ferghana Valley should be the result of social negotiation. Furthermore, that negotiation requires considering both the existing political economies and the needs of people's livelihoods.

As outlined above, the dilapidated infrastructural heritage of the late Soviet period has left huge problems which must be addressed. Water is limited in the Ferghana Valley and might become even scarcer in the Syr Darya basin over time due to climate change and population increase.<sup>173</sup> Moreover, these concerns are at the same time bound up with state territorialization and the construction of new collective identities.<sup>174</sup> Yet, the evidence presented above suggests that the core conflicts over land and water do not trace back to any inherent ethnic animosities, but to the economic and social modes that define the lives of each group.<sup>175</sup> This becomes particularly relevant as the ongoing processes of state-building foster new economic and moral attachments. Therefore, the decision of the bilateral and tripartite border commissions involving Kyrgyzstan, Uzbekistan, and Tajikistan on the final delimitation and demarcation of

the Ferghana Valley will have a decisive impact on these conflicts.<sup>176</sup> However, the border commissions have not yet finished their work and the process is likely to be slow at best.<sup>177</sup> The historical changes of these borders and their linkages with the spatial layout irrigation infrastructure must be taken into account if conflict over water is to be addressed.

International actors have been engaged with water and ecological issues in the Ferghana Valley for fifteen years, and they are likely to continue such work in the future.<sup>178</sup> Large sums have been invested, but limited results have been attained.<sup>179</sup> This is partly the result of the normal work constraints of the involved international agencies. However, involvement has largely taken place within the framework of promoting neo-liberal reforms leading to market economies and democratic politics in the region.<sup>180</sup> In the area of water management, the IWRM model was promoted both for its own survival and also as an indirect means of providing some kind of quid pro quo for broader governance reforms.<sup>181</sup> This may not always be the most productive way to resolve pressing water problems as overly normative or prescriptive approaches may divert attention from the stubborn realities on the ground. It is thus necessary to rethink approaches to water management and allow room for alternative conceptualizations.

### CONCLUSION

Yearly barter agreements remain the central mechanism to determine water and energy transfers between upstream and downstream countries.<sup>182</sup> Again, it is important to note that they do not only result from interstate relations characterized by an uncooperative mode, but also from the domestic politics in the respective states.<sup>183</sup> Currently Kyrgyzstan is still cash-strapped and, thus, limited in acquiring energy carriers from abroad.<sup>184</sup> Kyrgyzstan's inevitable need for heating during cold winters, and the government's inability to provide sufficient electricity, is likely to give rise to public discontent and political unrest.<sup>185</sup> Operating the Toktogul reservoir to generate hydropower in wintertime, therefore, is an urgent political and economic concern of the government of Kyrgyzstan.<sup>186</sup> A similar logic applies to Kyrgyzstan and Tajikistan interests in the construction of Kambar-Ata and Rogun dams as well as hydropower plants. Beyond solving perennial power shortages, both countries also hope to export electricity to Central Asia and neighbors and, thus, become regional energy suppliers.<sup>187</sup>

Conversely, political elites in Uzbekistan, and to some extent Tajikistan, rely on cotton production in the Ferghana Valley to generate income and to support the existing system of social, political, and economic control.<sup>188</sup> This partly accounts for leaders' unwillingness to change to less water-intensive crops in the Ferghana Valley.<sup>189</sup> Furthermore, any related economic change may not sustain the existing, cotton reliant systems, which are based on exploitation and rent-seeking.<sup>190</sup> Thus, the annual ad hoc barter agreements on the use of Syr Darya's water may be less the result of inter-state cooperation and more the result of the conflicting political interests of domestic actors within each country.

Addressing the challenges in Central Asia requires the reassessment of domestic and regional policies, including improvement to the water management infrastructure of the Aral Sea basin. Additionally, any improvements to, or expansion of, the irrigation systems in the Ferghana Valley must first consider the social and political challenges relating to irrigated agriculture.

International actors need to consider alternative approaches to water management outside of the prevailing neo-liberal reforms. Only by assessing the spatial layout of watercourses and irrigation infrastructure can resource management effectively avert conflicts over water and land in Central Asia.



## Endnotes: Liquid Challenges: Contested Water in Central Asia

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- <sup>5</sup> Vinogradov, *supra* note 1, at 397.
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- <sup>17</sup> Antipova et al., *supra* note 10, at 506.
- <sup>18</sup> Antipova et al., *supra* note 10, at 505-06.
- <sup>19</sup> Antipova et al., *supra* note 10, at 504.
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- <sup>21</sup> J. Thurman, *Dissertation*, *supra* note 7, at 242-45.
- <sup>22</sup> ERIKA WEINTHAL, HUMAN DEVELOPMENT REPORT 2006: WATER CONFLICT AND COOPERATION IN CENTRAL ASIA 5, 6 (2002) [hereinafter WEINTHAL].
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- <sup>24</sup> Antipova et al., *supra* note 10, at 505.
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- <sup>26</sup> JULIA BUCKNALL ET AL., IRRIGATION IN CENTRAL ASIA: SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSIDERATIONS i, ii (2003).
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- <sup>31</sup> BUCKNALL, *supra* note 27, at 4.
- <sup>32</sup> INT'L CRISIS GRP., ICG ASIA REPORT NO. 34, CENTRAL ASIA: WATER AND CONFLICT i, 6 (2002), <http://www.crisisgroup.org/~media/Files/asia/central-asia/Central%20Asia%20Water%20and%20Conflict.pdf> (last visited Sept. 12, 2011).
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- <sup>34</sup> *Id.* at 1.
- <sup>35</sup> M. THURMAN, *supra* note 28, at 8.
- <sup>36</sup> M. THURMAN, *supra* note 28, at 33.
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- <sup>48</sup> Antipova, et al., *supra* note 10, at 505.
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- <sup>62</sup> ICG ASIA REPORT NO. 34, *supra* note 32, at 17.
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## Endnotes: WEAK PLANNING PROCESS FRUSTRATES PROTECTION OF PUERTO RICO'S THREATENED COASTLINE

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- <sup>6</sup> Endangered and Threatened Wildlife and Plants; 90-Day Finding and 12-Month Determination on a Petition To Revise Critical Habitat for the Leatherback Sea Turtle, 76 Fed. Reg. 47133 (Aug. 4, 2011) (to be codified at 50 C.F.R. pt. 17), available at <http://www.regulations.gov/#!documentDetail;D=FWS-R4-ES-2011-0045-0001> (explaining that the revision is being done based on a recommendation from the EPA's five-year review of listed sea turtle species and upon completion of the review, the EPA would determine whether changes to the species status or critical habitat needed to be made).
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- <sup>18</sup> See generally George J. Stigler, *The Theory of Economic Regulation*, 2 THE BELL JOURNAL OF ECONOMICS AND MANAGEMENT SCIENCE, No. 1, 3-21 (Spring, 1971), [http://www.giuripol.unimi.it/Materiali%20Didattici/Regolazione%20dei%20Mercati%20-%20Ammannati/STIGLER\\_economicRegulation.pdf](http://www.giuripol.unimi.it/Materiali%20Didattici/Regolazione%20dei%20Mercati%20-%20Ammannati/STIGLER_economicRegulation.pdf) (introducing the modern theory that in time regulatory agencies come to be controlled by the industries they regulate).
- <sup>19</sup> See Irina Slinko et. al., *Laws for Sale: Evidence from Russia*, 7 AM. L. & ECON. REV. 284, 285 (2005).
- <sup>20</sup> See Sebastián Martinuzzi et al., *Land Development, Land Use, and Urban Sprawl in Puerto Rico Integrating Remote Sensing and Population Census Data*, 79 LANDSCAPE & URB. PLAN. 288, 289 (2007), [http://www.fs.fed.us/global/iitf/pubs/ja\\_iitf\\_2007\\_martinuzzi001.pdf](http://www.fs.fed.us/global/iitf/pubs/ja_iitf_2007_martinuzzi001.pdf).
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## Endnotes: LIQUID CHALLENGES: CONTESTED WATER IN CENTRAL ASIA

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- <sup>70</sup> *Id.* at 10-11.
- <sup>71</sup> David Trilling, *Kyrgyzstan: Melting Glaciers Threaten Central Asia's Ecological and Energy Future*, EURASIANET.ORG (Oct. 18, 2010), <http://www.eurasianet.org/node/62177>.
- <sup>72</sup> *Id.*
- <sup>73</sup> *Id.*
- <sup>74</sup> *Id.*
- <sup>75</sup> Libert et al., *supra* note 70, at 10.
- <sup>76</sup> Libert et al., *supra* note 70, at 14.
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- <sup>84</sup> *Id.*
- <sup>85</sup> See CHRISTINE BICHSEL, CONFLICT TRANSFORMATION IN CENTRAL ASIA: IRRIGATION DISPUTES IN THE FERGHANA VALLEY 38-40 (2009) (discussing irrigation issues in the Ferghana Valley).
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- <sup>87</sup> Sievers, *supra* note 45, at 374-75.
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- <sup>89</sup> Sievers, *supra* note 45, at 365.
- <sup>90</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 4.
- <sup>91</sup> Sievers, *supra* note 45, at 374, 401.
- <sup>92</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 5.
- <sup>93</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 13-14.
- <sup>94</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 5, 12-13.
- <sup>95</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 12.
- <sup>96</sup> Martin Kipping, *Can "Integrated Water Resources Management" Silence Malthusian Concerns? The Case of Central Asia*, 2 WATER INT'L 305, 311 (2008).
- <sup>97</sup> See Kipping, *id.* at 311 (arguing that the transnational nature of the water makes the local conflicts more difficult to resolve).
- <sup>98</sup> Cf. HAMMOND MURRAY-RUST ET AL., INT'L WATER MGMT. INST., RESEARCH REPORT No. 67, WATER PRODUCTIVITY IN THE SYR DARYA-RIVER BASIN 1, 4-5 (2003) (discussing the creation and effect of the ICWC as a means of reforming water management in the Syr-Darya River Basin).
- <sup>99</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 15-16.
- <sup>100</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 16.
- <sup>101</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 15-16.
- <sup>102</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 15-16.
- <sup>103</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 15-16.
- <sup>104</sup> See FRANCINE HIRSCH, EMPIRE OF NATIONS, ETHNOGRAPHIC KNOWLEDGE AND THE MAKING OF THE SOVIET UNION 1, 168-69 (2005) (discussing a petition by Uzbek-identified residents of villages on the Kirgiz side of the river claiming that they should be unified with Uzbekistan, as their identity was culturally Uzbek, and their villages were agricultural, rather than cattle breeding).
- <sup>105</sup> See HIRSCH, *id.* at 171 (expounding upon the difficulties in territorial disputes in the Ferghana Valley, where delineations were not always straightforward).

<sup>106</sup> See HIRSCH, *id.* at 170 (accentuating the fact that nationality was linked to land and resources).

<sup>107</sup> See HIRSCH, *id.* at 172 (discussing the great amount of work Soviet authorities put into drawing boundaries, as well as the continuing disputes that resulted).

<sup>108</sup> See HIRSCH, *id.* at 169 (discussing the distinction between animal husbandry and irrigated agriculture as a factor in determining where National borders lie).

<sup>109</sup> Max Spoor, *Agrarian Transition in Former Soviet Central Asia: A Comparative Study of Kazakhstan, Kyrgyzstan and Uzbekistan*, 1, 4-5 (Int'l Inst. of Soc. Studies: Working Paper No. 298, 1999) (describing specialization between Central Asian Countries; Uzbekistan specialized in cotton and Kyrgyzstan specialized in wool).

<sup>110</sup> Tjaart W. Schillhorn van Veen, *The Kyrgyz Sheep Herders at a Crossroads* 1, 4-8 (Overseas Dev. Group: Pastoral Dev. Network Series No. 38d, 1995) (discussing the transition to collectivism and then privatization under the Soviet scheme).

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<sup>112</sup> See Lerman & Sedik, *id.* at 4 (presenting current figures of fifty-five percent of product being crops and forty-five percent livestock).

<sup>113</sup> See *id.* at 4.

<sup>114</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 5.

<sup>115</sup> ICG ASIA REPORT No. 34, *supra* note 32, at ii.

<sup>116</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 5.

<sup>117</sup> HIRSCH, *supra* note 104, at 318.

<sup>118</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 3-4.

<sup>119</sup> Micklin, *supra* note 29, at 511.

<sup>120</sup> HIRSCH, *supra* note 104, at 318 (discussing the link between nationality, land, national rights, and economic and cultural resources as a result of Soviet influence).

<sup>121</sup> See ICG ASIA REPORT No. 34, *supra* note 32, at 10-11 (outlining the various international approaches to the water management issues in Central Asia).

<sup>122</sup> See ICG ASIA REPORT No. 34, *supra* note 32, at 4 (citing 42 examples of violent conflicts involving water); see also Philip Micklin, *supra* note 29, at 522 (discussing water management reform as a means of avoiding conflict).

<sup>123</sup> See Micklin, *supra* note 30, at 511-13 (discussing the problems caused by the shrinking Aral Sea).

<sup>124</sup> ICG ASIA REPORT No. 34, *supra* note 30, at 8-10.

<sup>125</sup> *Id.* at 6.

<sup>126</sup> ICG ASIA REPORT No. 34, *supra* note 30, at 6..

<sup>127</sup> See Micklin, *supra* note 29, at 524 (discussing the environmental impact of the Aral Sea problem).

<sup>128</sup> See Micklin, *supra* note 29, at 512-13 (discussing a reduction in irrigation as a necessity for improved management in the Aral Basin).

<sup>129</sup> See Micklin, *supra* note 29, at 515 (discussing water pricing, privatization of land and granting rights of self-governance as a means of institutional change to promote water efficiency).

<sup>130</sup> See SERVICE REFORM INITIATIVE, *supra* note 51, at 21 (describing the centralization of water management during the Soviet era).

<sup>131</sup> See SERVICE REFORM INITIATIVE, *supra* note 51, at 25 (discussing the argument for making users more responsible at the local level).

<sup>132</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 10 (pointing out the various projects launched since 1991 to resolve water conflict in Central Asia); see generally INT'L CRISIS GRP., ICG ASIA REPORT No. 33, CENTRAL ASIA: BORDER DISPUTES AND CONFLICT POTENTIAL (2002) (outlining the efforts made toward mitigating the impact of the Aral Sea disaster).

<sup>133</sup> See Sievers, *supra* note 45, at 393-97 (detailing the involvement of various international donors).

<sup>134</sup> Sievers, *supra* note 45, at 393-97.

<sup>135</sup> See Micklin, *supra* note 29, at 518-20. Most prominently is the Aral Sea Basin Programme (ASBP), which began in 1994 with the original plan to extend it over a period of fifteen to twenty years, and financed jointly by the World Bank, UNDP, and UNEP. The aims of the programme were: rehabilitation and development of the disaster zone; strategic planning and comprehensive management of the Amu Darya and Syr Darya Rivers; and building institutions for planning and implementing the two first points. The third point led to the foundation of ICAS and IFAS mentioned earlier. After a review of the ASBP in 1996, the World Bank, together with GEF, launched the Water and Environmental Management Project for the period 1999 to 2003. Between 1993 and

1998 USAID funded the Environmental Policy and Technology project, which supported regional efforts to come to an agreement on the operation of the Toktogul Reservoir. In 2001 it launched the Natural Resource Management Project, the water component of which aimed at improving inter-state cooperation and sharing of the Syr Darya River flow. This project was further expanded in 2002. The European Union ran the Water Resources Management and Agricultural Production (WARMAP) project starting in 1995 for the utilization, management and allocation of water in Central Asia.

<sup>136</sup> See generally WEINTHAL, *supra* note 23, at 51-2 (arguing that more emphasis should have been put on agriculture); see generally Sievers, *supra* note 45 (arguing that international agencies have not lived up their promises or regional expectations).

<sup>137</sup> See accord JÜRIG KRAHENBÜHL ET AL., SWISS AGENCY FOR DEVELOPMENT AND COOPERATION, SWISS WATER STRATEGY FOR CENTRAL ASIA 2002-2006: STRENGTHENING REGIONAL WATER MANAGEMENT CAPACITIES, 3, 4-6 (2002) (discussing the Swiss Water Strategy for Central Asia); see also ICG ASIA REPORT No. 34, *supra* note 32, at 10 (discussing regional and international water management efforts); see accord RUTH S. MEINZEN-DICK & BRYAN RANDOLPH BRUNS, NEGOTIATING WATER RIGHTS: INTRODUCTION, IN NEGOTIATING WATER RIGHTS (Bryan Randolph Bruns & Ruth S. Meinen-Dick eds., 2000) (discussing WUAs as well as other institutions developed to deal with water conflict in Central Asia); see accord Jennifer Sehring, *Irrigation Reform in Kyrgyzstan and Tajikistan*, 21 IRRIGATION & DRAINAGE SYS. 277, 277, 283 (2007) (describing the role of WUAs and other institutions in Kyrgyzstan and Tajikistan).

<sup>138</sup> SERVICE REFORM INITIATIVE, *supra* note 51, at 94 (suggesting that even with the ICWC, agreements on water allocation tend to occur on a yearly basis).

<sup>139</sup> Micklin, *supra* note 29, at 559-60 (explaining that a return of the sea to its pre-1960's condition would require a substantial increase of inflow and a significant decrease in consumptive use for irrigation); see Micklin, *supra* note 29, at 561 ("Although restoration of the Aral to, or near, its pre-1960s level and ecological state is not a reasonable prospect, various partial rehabilitation scenarios for the sea and river deltas hold considerable promise.").

<sup>140</sup> See Weinthal, *supra* note 23, at 67 (describing a water, energy and agriculture approach which could have been taken rather than the water or water and energy approach taken by most international agencies).

<sup>141</sup> See Weinthal, *supra* note 23, at 68 (arguing that agriculture was ignored because specialists preferred simple technical solutions over complicated political solutions).

<sup>142</sup> See Sievers, *supra* note 45, at 383 ("The erosion of this general presumption of the efficacy and moral authority of international organizations coincides with the expansion of the Central Asian states' participation in international environmental regimes."); see also Sievers, *id.* at 396 (discussing the failure of indigenous environmental NGOs to counterweight failed regional programs).

<sup>143</sup> See generally JÜRIG KRAHENBÜHL ET AL., *supra* note 137; see generally MURRAY-RUST ET AL., *supra* note 98, at 4-6.

<sup>144</sup> MURRAY-RUST ET AL., *supra* note 98, at 12 (explaining that upon the withdrawal of The World Bank's funds for competitions promoting water efficiency, IWMI came together with SIC-ICWC to continue to strengthen water saving practices).

<sup>145</sup> MURRAY-RUST ET AL., *supra* note 98, at 12 ("The overarching goal of the project is to forge a gradual change in attitude of water users and water managers at all levels in the hierarchy towards water as a limited resource and prepare indicative recommendations for policymakers regarding irrigation water allocations within the region.").

<sup>146</sup> JÜRIG KRAHENBÜHL ET AL., *supra* note 137, at 3, 20 (2002) (explaining that the goal of the IWRM, in part, is to reorganize water management on the basis of hydraulic boundaries).

<sup>147</sup> JÜRIG KRAHENBÜHL ET AL., *supra* note 137, at 3, 16 (2002) (discussing the objectives of the Swiss Water Sector Interventions, including automation and technical improvement of canal systems).

<sup>148</sup> See generally *Second On-Farm Irrigation Efficiency Program*, THE WORLD BANK, <http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=258599&menuPK=258625&Projectid=P126390> (last visited Oct. 24, 2011); Asian Development Bank, Building Capacity for the Formation and Management of Water User Associations, [Adb.org, http://www.adb.org/projects/project.asp?id=29515](http://www.adb.org/projects/project.asp?id=29515) (last visited Oct. 24, 2011); Academy for Educational Development, *Central Asia Water User Association Support Program*, [AED.org http://www.aed.org/Projects/WUASP.cfm](http://www.aed.org/Projects/WUASP.cfm) (last visited Oct. 24, 2011); Rural Infrastructure Rehabilitation Project, THE WORLD BANK <http://web.worldbank.org/external/projects/main?pagePK=104231&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P058898> (last visited Oct. 24, 2011). WUAs are non-commercial voluntary associations of water users

financed by members' payments for water service delivery. Usually established along the boundaries of the former state and collective farms, they are intended to operate, maintain and rehabilitate the irrigation system, deliver water to the end users, purchase water from the state, and collect water fees from the users.

<sup>149</sup> See Jenniver Sehring, *Irrigation Reform in Kyrgyzstan and Tajikistan*, 21 IRRIGATION & DRAINAGE SYS. 277, 283 (2007) (explaining that although the introduction of market-economics is often seen as the main tool for reaching greater efficiency, there are several problems in implementing such a scheme).

<sup>150</sup> *Id.*

<sup>151</sup> See Sehring, *supra* note 149, at 284 (pointing to three basic reasons for non-payment of water-related fees: soviet mentality, lack of understanding, and widespread poverty).

<sup>152</sup> See Sehring, *supra* note 149, at 284 (discussing the lack of perceived legitimacy).

<sup>153</sup> See Sehring, *supra* note 149, at 284 (citing the failure to prevent or punish water theft as one of the reasons they are perceived as illegitimate).

<sup>154</sup> Sehring, *supra* note 149, at 285-87 (discussing WUA an introduction of democratic grass roots to the water management issues, while explaining where these policies have failed actual users, in part because the individuals do not understand the system).

<sup>155</sup> Sehring, *supra* note 149, at 287 (explaining that existing power structures have dominated over attempted reforms, as the political culture is characterized by a lack of proactiveness and an orientation to respect village leaders).

<sup>156</sup> Kipping, *supra* note 98, at 315.

<sup>157</sup> See, e.g., *Transboundary Water Management in Central Asia*, GIZ, <http://www.gtz.de/en/weltweit/eurpa-kaukasus-zentralasien/29994.htm> (last visited Oct. 24, 2011) (discussing the context, objective, and approach for GIZ's involvement in water management in Central Asia) [hereinafter *Transboundary Water Management in Central Asia*].

<sup>158</sup> *Id.*

<sup>159</sup> See *A Source of Peace – Transboundary Water Management in Central Asia*, CAwater-info.net, [http://www.cawater-info.net/projects/pdf/fact\\_sheet\\_programme\\_cas\\_en.pdf](http://www.cawater-info.net/projects/pdf/fact_sheet_programme_cas_en.pdf) (last visited Oct. 24, 2011) (citing the advisory services as a reason for increased expertise and management capacities of IFAS) [hereinafter *A Source of Peace*]; see also *Transboundary Water Management in Central Asia*, *supra* note 157 (“The programme provides funds for technical equipment, such as measuring devices, or supplies this equipment itself.”).

<sup>160</sup> See *A Source of Peace*, *supra* note 159. (describing the overall objective for improvement of watercourse management for selected transboundary rivers).

<sup>161</sup> See *A Source of Peace*, *supra* note 159 (outlining GIZ's approach involving training personnel as well as interdisciplinary and cross-regional dialogue).

<sup>162</sup> See *A Source of Peace*, *supra* note 159 (stating that in addition to institutional measures, the program provides technical assistance in the form of measurement devices and other equipment).

<sup>163</sup> See Micklin, *supra* note 29, at 522 (suggesting that absent significant improvements, water use will be a continuing source of conflict in Central Asia).

<sup>164</sup> See generally Micklin, *supra* note 29, at 522-23 (discussing the ongoing water management problems in Central Asia as they relate to the Ferghana Valley).

<sup>165</sup> See, e.g., *Aral Sea Desertification*, RAP361.COM (Oct. 25, 2011), <http://rap361.com/?p=14962>.

<sup>166</sup> ICG ASIA REPORT No. 34, *supra* note 32, at 6. (discussing a Soviet Union plan to use nuclear weapons on a glacier to refill the Aral Sea basin).

<sup>167</sup> See Micklin, *supra* note 29, at 520-21 (discussing the successes and continuing needs of the five Central Asian States involved in the water management issue).

<sup>168</sup> See Micklin, *supra* note 29, at 520-21 (explaining the continued absence of a water management infrastructure will allow for a continuation of nations serving their own water and energy interests at the expense of others due to an expansion in agriculture).

<sup>169</sup> Micklin, *supra* note 29, at 515.

<sup>170</sup> See generally ICG ASIA REPORT No. 34, *supra* note 32, at 21 (discussing the construction of hydropower complexes as a partial solution to the conflict).

<sup>171</sup> See ICG ASIA REPORT No. 34, *supra* note 32, at 24 (suggesting that Tajikistan would have to raise from US \$700 million to US \$1 billion to complete the hydropower project).

<sup>172</sup> See RUTH S. MEINZEN-DICK & BRYAN RANDOLPH BRUNS, *NEGOTIATING WATER RIGHTS: INTRODUCTION*, IN *NEGOTIATING WATER RIGHTS 27* (Bryan Randolph Bruns & Ruth S. Meizen-Dick eds., 2000) (arguing that water rights should be seen as a negotiating process and is not simply deduced from economic, technical or legal analysis).

<sup>173</sup> SERVICE REFORM INITIATIVE, *supra* note 51, at 24 (arguing that population increase in conjunction with changing climate will make water resources even more scarce).

<sup>174</sup> SERVICE REFORM INITIATIVE, *supra* note 51, at 99-100 (discussing the financial restraints and conflicts between territorial entities as a hindrance to solving water management issues).

<sup>175</sup> See ICG ASIA REPORT No. 34, *supra* note 32, at 5, 12-14; see also Kipping, *supra* note 98, at 312-13.

<sup>176</sup> See INT'L CRISIS GROUP, *ICG ASIA REPORT No. 33, Central Asia: Border Disputes and Conflict Potential*, 13 (2002). (“[T]he Ferghana Valley has been at the centre of border disputes between Uzbekistan and Kyrgyzstan.”).

<sup>177</sup> See *id.* at 4, 6 (suggesting that final demarcation of borders will not happen in the near future, in part, because of a lack of political will).

<sup>178</sup> See WEINTHAL, *supra* note 23, at 51 (Describing the involvement of the World Bank, UNDP and UNEP, as well as ICAS and IFAS); see also Sievers, *supra* note 45, at 393-97 (discussing the failure of international institutions to take meaningful action to solve the water problems in Central Asia).

<sup>179</sup> See Micklin, *supra* note 29, at 515; see also Sievers, *supra* note 45, at 383 (discussing the lack of organization and cooperation between international funders and state governments).

<sup>180</sup> See Sievers, *supra* note 45, at 397 (suggesting that the goal of international agencies is to move the region towards a market-based economy).

<sup>181</sup> See SERVICE REFORM INITIATIVE, *supra* note 51, at 38 (detailing the components of the IWRM).

<sup>182</sup> See SERVICE REFORM INITIATIVE, *supra* note 51, at 94 (explaining that agreements tend to be bilateral rather than multi-lateral, yearly instead of long term, and often fail to be implemented by one, if not all, sides); see also ICG ASIA REPORT No. 34, *supra* note 32, at i (“An annual cycle of disputes has developed between the three downstream countries – Kazakhstan, Turkmenistan and Uzbekistan – that are all heavy consumers of water for growing cotton, and the upstream nations – Kyrgyzstan and Tajikistan.”).

<sup>183</sup> See generally ICG ASIA REPORT No. 34, *supra* note 32, at 6-7 (describing recent political changes in Kyrgyzstan).

<sup>184</sup> See generally INT'L CRISIS GRP., *ICG ASIA BRIEFING No. 79, KYRGYSTAN: A DECEPTIVE CALM* (2008). (discussing corruption and monopolization as well as lack of training as reasons for continued financial crisis).

<sup>185</sup> See ICG ASIA BRIEFING No. 79, *id.* at 14 (explaining a statement by Chudinov Sheppling pointing out that Kyrgyzstan will have to reduce its energy consumption by thirty percent and will only have enough electricity for lighting).

<sup>186</sup> See ICG ASIA BRIEFING No. 79, *supra* note 184, at 13 (explaining that the water level in Toktogul, the country's largest reservoir and the source of most of its energy, was catastrophically and inexplicably low).

<sup>187</sup> See BANK INFORMATION CENTER, *supra* note 82, at 6-7 (explaining that the majority of water originates in Tajikistan and Kyrgyzstan, but is not used there).

<sup>188</sup> See WEINTHAL, *supra* note 23, at 68 (discussing the reliance on cotton production for social control and political stability).

<sup>189</sup> See WEINTHAL, *supra* note 23, at 68 (explaining that Turkmenistan and Uzbekistan could not jeopardize the foreign revenue from the cotton industry).

<sup>190</sup> See WEINTHAL, *supra* note 23, at 68.