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Quality of Government and Quality of Water

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Abstract:

According to a conservative estimation by the World Health Organization, 1.2 billion people lack access to sufficient quantities of safe water, and 2,6 billion people are without adequate sanitation. Consequently, 80 percent of all illnesses in the developing world are estimated to be the result of waterborne diseases claiming the lives of 1,8 million children every year. This paper investigates to what extent this problem is related to the quality of government (QoG) institutions. Two different water quality measures are used – one measuring ecosystem water quality and another measuring access to safe drinking water. The central question is if there is an independent effect of quality of government besides the effects of democratic rule and good economic resources. The results are that for ecosystem water quality, we could not fine that QoG had an independently positive effect. However, this result may have to do with the low quality of available data from many poor countries. Taking into consideration the interaction effect between QoG and economic prosperity, however, we find that there is an independent effect of government effectiveness on the access to safe drinking water, especially in poor countries.

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Lack of Safe Water, Quality of Government and Cholera

On June 16, 2006, the world leading daily newspaper *The New York Times* had a front-page article about Angola. The article is introduced by a large picture showing two young boys and one young girl - a fair guess is that they are about ten years old- fetching water at a stream that runs through what looks like an incredibly large garbage dump. The article starts with the following words: “In a nation whose multibillion dollar oil boom should arguably make its people rich enough to drink Evian, the water that many in this capital depend on goes by a less fancy name: Bengo. The Bengo River passes north of here, its waters dark with grits, its banks strewn with garbage”. The article goes on describing how poor Angolans living in the slums of the capital Luanda have no other option than to use the polluted water from the Bengo river and that this is the reason for why one of the worst cholera epidemics to strike Africa has occurred that has sickened over 43.000 people and killed more than 1.600 since its outbreak in February that year. Cholera typically spreads through contact with contaminated water and according to the article, this problem is everywhere in Luanda’s slums. As the picture shows, “children stripped to their underwear dance through sewage-clogged creeks and slide down garbage dumps on sleds made of sheet metal into excrement-fouled puddles”. The article continuous by stating that economists say that the oil-boom has resulted in a situation where the Angolan government have a huge budget-surplus and more money than they can spend and yet they seem unable to provide the population with such a basic thing as safe water and sanitation that would make the Cholera epidemic preventable. The article concludes by citing experts from various international organizations who argue that the situation is caused by two factors – the lack of infrastructure and huge influx of people to the capital due to the civil war that ended in 2002 and the high level of corruption.

Water and the Quality of Government: A Changing Agenda

When the leading international anti-corruption organization *Transparency International* published its annual Global Corruption report for 2008, the specific focus in the report as well as the title was “Corruption in the Water Sector”. The report contains no less than twenty-three chapters covering more than one hundred pages analyzing this specific connection between corruption and the provision of safe water. In addition, a semi-public international organization about this specific problem was established in 2006 called the *Water Integrity Network* funded by grants from the international development authorities in Germany, the Netherlands, Sweden and Switzerland.[1] In addition to policy initiatives, this network brings together anti-corruption civil society movements and water professionals. Thus, both in media and in leading policy and advocate organizations, there is an increasing apprehension that lack of safe water is a major obstacle to human well-being and population health in the world and that this problem is to a large extent caused by factors that can be defined as the *quality of government* (QoG) issues (Rothstein and Teorell 2008). A number of studies have shown a correlation between environmental protection in general and factors related to the structure or quality of political institutions (Jahn 1998; Morse 2006; Welsch 2004). And asked to review the lessons of the World Bank policies for alleviating poverty in developing countries, Lawrence Summers – former Chief Economist of the World Bank, President of Harvard University and currently the Director of the White House´s National Economic Council under President Barak Obama – have argued that “an overwhelming lesson that I think we have learned in the 1990s is… the transcendent importance of the quality of institutions and the closely-related questions of the efficacy of political administration” (ctied in Besley and Ghatak 2007).

The magnitude of the quality of government (henceforth QoG) problem regarding the specific issue of people’s access to safe water can be illustrated by the following example. According to a conservative estimation by the World Health Organization, 1.2 billion people lack access to sufficient quantities of safe water, and 2,6 billion people are without adequate sanitation. Consequently, 80 percent of all illnesses in the developing world are estimated to be the result of waterborne diseases claiming the lives of 1,8 million children every year (UNDP 2006). A conservative estimate is that 12.000 people die every day from water and sanitation related illnesses (Cunningham and Cunningham 2008; Krause 2009; Postel and Mastny 2005; Stålgren 2006a). This enormous problem is by an increasing number of experts in the area no longer seen as an engineering problem, that is, it is not lack of technical solutions (pumps, reservoirs, dams, etc.) that is the main obstacle for why such large numbers of mainly poor people in developing countries lack access to safe water. Neither is it seen as a problem caused by lack of natural supply of clean water. Instead, the problem seems to be related to the existence of dysfunctions in the structure of the legal and administrative institutions. More

[1] See http://www.waterintegritynetwork.net/

precisely, the problem is seen as caused by lack of adequate institutions for maintenance, pricing and distribution of rights to land and water (Anbarci, Escaleras and Register 2009; Bruns and Meinzen-Dick 2000; Burns and Meinzen-Dick 2000; Krause 2009; Meinzen-Dick 2007; Sjöstedt 2008).

According to the report by Transparency International mentioned above, there are an almost infinite number of reasons why corruption and other forms of low QoG can be detrimental to the provision of safe water. Among these are private companies that illegally pollute natural water resources and thereby destroying the ecological system which by paying bribes may avoid being prosecuted and punished by the justice system. Water resources management, not least in delicate ecosystems is often a complicated matter both technically and conceptually and therefore prone to be an area were different interests may collude (cf. Krause 2009; cf. Stålgren 2006b). In the struggle over the use of natural water resources, kick-backs as well as forms of patronage and clientelistic politics may play a large role. Similarly, ordinary people's lack of legally documented and guaranteed property rights to the land they use may prevent them from investing in necessary technical equipment (Sjöstedt 2008). Provision of safe water often requires huge investments in dams, water cleaning equipment and sewage systems that are carried out by private contractors. Public procurement for big contracts is a well-known source for large-scale corruption resulting in too high costs and too low quality of the constructions that, eventually, are put in place. For example, in India, it is estimated that more then 25 percent of the costs for irrigation systems are lost in bribery. Many of these installations are technically very complicated which is likely to increase difficulties for transparency in the procurement process. Petty corruption at the point of service delivery may deter people from using safe water and may also lead them to be reluctant to pay for water at all since they may suspect that the money will be stolen instead of being used for maintenance of the safe water equipment. This in turn may lead to water managers having far too little money for keeping the installations running. In some countries, this is a huge problem. For example, one study from India show that 40 percent of water customers had, during the previous six months, been making small payments to falsify meter readings so as to lower their water bills (Davis 2004). Similarly, a national survey in Guatemala showed that more than 15 percent of the population reported to have paid a bribe for getting a water connection. In Bangladesh and Ecuador, "private vendors, cartels and even water mafias have been known to collude with public water officials to prevent network extension" (Sohail and CAvill 2008, 44). In subsidies for irrigation systems, there are also many known cases when policy influence by large and strongly organized interest groups with large economic resources have resulted in policy outcomes that are heavily geared towards benefitting their own interests at the expense of "the common good" and of agents that are not so easily organized or economically strong. For example, a study of Mexico shows that the largest 20 percent of farmers get more than 70 percent of government subsidies for irrigation (Rijsberman 2008).

A Lack of Systematic Empirical Comparative Analyses

The above mentioned analyses are theoretically as well as empirically convincing in their claim that there is a causal link between Quality of Government (QoG) and Quality of Water (QoW). In political science and environmental studies there is a debate going on about the effect democracy has on the environment. Some scholars claim that democracy reduces environmental degradation whereas others argue that this is not true and that democracy in fact can have a negative impact on the environment. Using different methods and data, the results are inconclusive since there is empirical evidence in support of both arguments (Karlsson et al. 2010; Midlarsky 1998; Neumayer 2002). One paper that is of direct interest for our argument is a study by Pellegrini and Gerlagh (2010). Their dependent variable is an index called *Environmental Policy Stringency* and as dependent variables they use two standard measures of democracy and corruption.[2] Their question is to compare democracy and corruption as determinants of the stringency of a country's environmental policy. The result of their analysis is that corruption is more important than democracy as an explanatory variable. Thus, in this analysis, democracy has a limited impact on environmental policies, and they argue that several other studies tend to overemphasize the importance of each variable. The authors conclude that it seems likely that previous empirical work have been overemphasizing the role of democracy for environmental policies and for environmental quality because of the omission of a corruption index as a control variable. Their conclusion is thus that reducing corruption would result in stricter environmental policies and that democracy on its own would not be sufficient.

One problem in the existing literature is that many studies are either country specific or even regional/local case studies. The few comparative studies that exists have either only compared

[2] *Democracy* is taken from from Polity IV, produced by ICSR of the University of Maryland and their measure of *corruption* is Transparency International Corruption Perception index from 1995

a relatively small set of countries or not been using various measures of Quality of Water as their specific dependent variable. In this study, we intend to remedy this lack of knowledge by analyzing data from a larger set of countries to see if, and if so how much, different QoG variables can explain different QoW variables.

Cross-Country Water Quality: Basic Patterns

We will begin the empirical analysis by looking at some basic cross-country bivariate relationships between different measures of water quality on the one hand and measures of quality of government, levels of democracy, and GDP per capita on the other. The data come from the Quality of Government open source dataset (Teorell et al. 2009). Arguably, water quality is one of the most important factors relevant to ecosystem health as well as to human health. We will use *two* different water quality measures – one more relevant to ecosystem health and another more relevant to human health. Both are taken from the underlying indicators behind the 2010 Environmental Performance Index (EPI) created by the Yale Center for Environmental Law & Policy. The measures were first applied full-scale in 2006 and have since been updated in 2008 and in 2010.

The *ecosystem water quality* index (WQI) concerns fresh water and is based on five parameters – dissolved oxygen, pH value, electrical conductivity, total nitrogen, and total phosphorus. Parameter measures are obtained at water monitoring stations and collected by UNEP/GEMS Water and European Environmental Agency (EEA) Waterbase. *The human oriented water quality* measure is based on two indicators provided by UNICEF-WHO combining the percentage of a country's population with "reasonable access" to an improved source of sanitation and an improved source of drinking water (see also Sjöstedt 2008, p. 11-12). The latter is defined as having as least 20 liters/person/day from a source within one kilometre from the dwelling (ibid. p 7). The two measures of water quality are empirically related to each other but the correlation is rather modest, only +.36.

The quality of government measures that we employ as independent explanatory variables are two – the World Bank's government effectiveness scale control of corruption index. In theory the two QoG-variables stand for different things. In practice, however, they are very closely related with a correlation of about +.90 between them. Levels of democracy as measured by Freedom House/Polity and GDP per capita (Gleditsch 2002; Marshall and Jaggers 2002) are two obvious control variables. We know from previous research that both of them have a relationship with water quality (Emerson 2010). Rich democracies tend to have better water quality than poor non-democracies. In testing the eventual effect of quality of government on water quality we want to control for the known and more general effects of democracy and economic development. Our question is: Can we find an independent effect of quality of government on top of or besides the effects of democratic rule and good financial resources.

The Water quality measures are updated every other year. The most recent measure is from 2010 and covering some 195 countries. Before that there are data from 2008 and 2006. A rather astonishing problem we quickly came across when using the ecosystem water quality variable (WQI) – but not when studying the human health related water quality variable - is that the cross-years correlations for the WQI results were very low.[3] For example, the correlation between the measures for 2006 and 2008 is only +.32. The comparable correlation for the years 2006 and 2010 is marginally higher, +.39. This means that a sizeable number of countries with relatively high ecosystem quality water one year have relatively bad water the next.

However, for the two most recent measures in 2008 and 2010 the correlation is improved to +.67; a more decent result, but still not quite acceptable. Many countries with good ecosystem water 2008 have bad water 2010 and vice versa. It is difficult to believe that these rather dramatic changes have occurred in reality. There must be some measurement problems. And true enough that is what there is. As it turns out the ambitious measurements of ecosystem water quality based on parameter readings at monitoring stations were only possible to complete in 74 countries in 2010 and in 94 countries in 2008. For countries with no data different imputation methods were used. In plain language, educated guesses were made for countries with no, or no recent information on their ecosystem water quality. Furthermore, different imputation methods were used over the years. In 2008, for example, average regional imputed values were employed while in 2010 a multiple regression imputation model was applied. The methodology used in 2010 meant that imputed data for GDP per capita, BOD effluents, stringency of regulatory environment, fertilizer use, population density,

[3] The correlation between the human related water quality variables 2008 and 2010 is +.97. For all practical purposes the two measurements are identical in the way they sort countries.

corruption of public sector, ecological footprint, and many more variables very included in creating the WQI-values in countries without empirical measurements. In 2010 imputed values were employed for 121 countries, i.e. for a sizeable majority of the cases. Real measures of water quality are only available for 74 countries in the 2010 version of the ecosystem Water Quality Index.

In our analysis of ecosystem water quality we focus on the WQI data for 2010. At the end of the article in a special appendix eight bivariate scatter plots are published with the ecosystem water quality index run against the two QoG-variables (government effectiveness and control of corruption), the level of democracy variable and the variable measuring GDP per capita (log). The scatter plots come in two versions – one for all countries with some kind of WQI-value (=195 cases), and one for the limited number of countries with real measured WQI-values (=74 cases).

Similar scatter plots are created for the relationships between the human related water quality variable and the two QoG measures, GDP/capita (log), and levels of democracy. These four scatter plots are also found in the special appendix at the end of the article. The results for the analysis of ecosystem water quality are summarized in Table 1. As expected, level of democracy as well as GDP per capita are both positively related to ecosystem water quality among all countries and among countries with real measured water quality. The bivariate correlations are medium-sized between +.28 and +.44. Importantly, the correlations for our QoG-variables (government effectiveness and control of corruption) are also significant and positive among all countries as well as among the smaller number of countries with non-imputed WQI-values. The correlations for the QoG measures varies between +.28 and +.51.

Table 1: The Relationship Between Ecosystem Water Quality and Government Effectiveness, Control of Corruption, Level of Democracy, and GDP per Capita Among All Countries and Among Countries with Real Measured Values For Water Quality (Correlations (r))

	All Countries With or Without Imputed Values For Water Quality	Only Countries With Real Measured Values For Water Quality
Government Effectiveness	+.51	+.28
Control of Corruption	+.44	+.28
GDP per Capita (Log)	+.44	+.28
Level of Democracy	+.37	+.39
Number of Countries	About 180	About 85

Comments: The Water Quality Index (WQI) is from 2010 and is constructed by Yale Center for Environmental Law & Policy. It is intended to measure water quality effects on ecosystems. The index is based on systematic measurements of five parameters – dissolved oxygen, electrical conductivity, pH, total phosphorus, and total nitrogen – at monitoring stations. Real hard measurements are obtained from about 85 countries; for another 95 countries WQI-values were imputed based on regression models employing around ten predictor variables (for example GDP per capita, institutions for environmental sustainability, control of corruption, urban population, fertilizer use, access to safe water and sanitation). The positive correlations mean that high water quality is related to high government effectiveness, to low levels of corruption, to high GDP/capita and to high levels of democracy.

One is tempted to say, so far so good. The QoG variables are in play. They have positive relations with ecosystem water quality across all countries as well as among countries with hard measures of water quality. Now comes a tougher test. Is quality of government related to WQI among democratic as well as among less democratic nations and among rich as well as among poor countries? The question is if the QoG variables survive multi variable controls for level of democracy and GDP per capita (log).

The answer is yes they survive and no they do not survive. The results in Table 2 reveal why we get two different answers. When we regress the ecosystem water quality index on the variables for government effectiveness, level of democracy and GDP per capita for all countries only the QoG measure receives a significant and positive coefficient on the .01-level. The coefficients for level of democracy and economic development turn out to be positive as well but insignificant. However, in a similar regression among the smaller sample of countries with real measures of ecosystem water quality, the QoG variable has no significant effect and the coefficient even has a negative sign. The coefficient for GDP per capita is also non-significant while this time the effect of level of democracy is significant on the .05-level.

Table 2: Regressing Ecosystem Water Quality on Government Effectiveness, Level of Democracy, and GDP/Capita Among All Countries and Among Countries With Real Measured Values For Water Quality (Regr. Coeff.)

	All Countries		Only Countries With Real Measured Values for Water Quality	
	regr. coeff.	std. err.	regr. coeff.	std. err.
Government Effectiveness	8.8***	2.5	-.3	3.2
GDP per Capita (Log)	.2	1.5	.9	2.1
Level of Democracy	.4	.5	1.7**	.7
Constant	56.1***	11.8	57.7***	16.1
Adj. R-squared	.25		.12	

Comments: p>/t/=.01***; =.05**; =.10*. The total number of cases is 178 in the analysis with all countries and 83 in the analysis with countries having real measured values for water quality. See also Table 1.

It is not self-evident why this difference in outcome occurs. The suspicion that it has to do with a lack of variance and an overrepresentation of developed and democratic countries in the sample of nations with real measures of ecosystem water quality is only partially born out. Among the countries with real measured water quality about half are European and/or OECD countries (37), but the other half are countries from Africa (Kenya, Tanzania, and Egypt for example), from Asia (for example Sri Lanka, Indonesia, and Philippines) and from Latin-America (Bolivia, Cuba, and Peru as examples). But it is true that among countries with imputed values for ecosystem water quality, most are from the less developed and less democratic parts of the world. For example, only 8 of them are European – Andorra, Belarus, Liechtenstein, Malta, Monaco, Moldova, San Marino, and Ukraine. Among the other eighty five some thirty five are from Africa while the other fifty are from Asia, Latin-America or Oceania.

Our main conclusion from this somewhat disappointing research endeavour into ecosystem water quality is threefold. First, it is a problem that the across-time data of the Environmental Performance Index's biannual Water Quality Index is so shaky. The imputation methods have varied across years creating unreliable data across time. Second, effect analyses involving known explanatory variables behind good water yield very different results for the full data set encompassing all countries in comparison with the more limited dataset containing only countries with real measured ecosystem water quality. Third, quality of government variables can not be proven to be independently related to high ecosystem water quality. Although the QoG variables were independently and positively connected to ecosystem water quality in the full sample of countries, they were not significantly related in the more limited sample of countries with real measured ecosystem water quality.

Being critical empiricists we tend to give real measurements the benefit of doubt. Imputations we trust less. Consequently and so far our hypothesis that good government is independently good for good water has not been proven correct. At least not for ecosystem water quality.

But what about human health related water quality? Does quality of government have an independent effect on people's "reasonable access" to safe water as defined above.

Table 3: The Relationship Between Water Quality (Effects on Humans) and Government Effectiveness, Control of Corruption, Level of Democracy, and GDP per Capita (Correlations (r))

	Correlation
Government Effectiveness	+.64
Control of Corruption	+.60
GDP per Capita (Log)	+.76
Level of Democracy	+.39
Number of Countries	About 190

Comments: The variable Water Quality (Effects on Humans) is part of the 2010 Environmental Performance Index constructed by the Yale Center for Environmental Law & Policy. The variable is based on two indicators provided by UNICEF-WHO: The percentage of a country's population with access to 1) an improved source of sanitation and 2) an improved source of drinking water. The positive correlations indicate that good water quality is related to high government effectiveness, to low levels of corruption, to high GDP/capita and to high levels of democracy.

The results in Table 3 show a promising beginning. The relevant correlations are positive and stronger than the similar correlations for ecosystem water quality. Human related water quality is clearly related to government effectiveness as well as to control of corruption. High government effectiveness and low corruption is connected to good water quality for humans. However, good human water is also strongly related to economic development and level of democracy. Rich and democratic countries tend to have better water for humans than poor and autocratic countries.

In Table 4 we control the linear effects of level of democracy and GDP/capita (log) on human related water quality by jointly regressing them on the water variable together with the government effectiveness variable. The question is if the QoG variable survives such a control? To play it extra safe, we have run the regression among all countries as well as among non-OECD countries only. The later analysis is done to really make sure that eventual separate effects among poorer countries have a good chance to be detected.

Table 4: Regressing Water Quality (Effects on Humans) on Government Effectiveness, Level of Democracy, and GDP/Capita Among All Countries and Among Non-OECD Countries Only (Regr. Coeff.)

	All Countries		Only Non-OECD Countries	
	regr. coeff.	std. err.	regr. coeff.	std. err
Government Effectiveness	-.8	2.9	2.3	3.4
GDP per Capita (Log)	14.4***	1.7	15.0***	1.8
Level of Democracy	.3	.6	.2	.6
Constant	-40.7***	13.6	-42.5***	14.7
Adj. R-squared	.57		.52	

Comments: p>/t/=.01***; =.05**; =.10* The number of cases is 187 for all countries and 157 for the Non-OECD countries. See also Table 3.

At a first glance, the results may seem a bit disappointing. There is no significant effect of government effectiveness on human related water quality. Not among all countries and not among poorer Non-OECD countries only. The only significant effect is found for economic development. Rich countries have the effect of providing better water than poor countries. And this economic variable overshadows completely the eventual linear effect of the quality of government variable. However, since economic development is very strongly related to the quality of government variables we have a serious case of multicolinearity. It is difficult to distinguish between the effects of the two variables. One interesting example of that is that the effect of the QoG variable in Table 4 becomes highly significant if we substitute the GDP/capita (log) variable for an unlogged GDP/capita variable. One of the reasons for this is that the logged GDP/capita variable among all countries is stronger correlated with the government effectiveness variable (r=.83) than the unlogged version of the GDP/capita variable (=.73). The conclusion is that the two variables are so closely connected that it is very problematic to talk of separate effects.

One way of not solving the problem but at least highlight the interconnectedness between economic development and quality of government in providing people with healthy drinking water is to introduce the notion of an interplay between the two and a possible interaction effect on human related water quality. In Table 5 we have done that by introducing an interaction term between GDP/capita (log) and the government effectiveness variable in our model from Table 4. The idea is that it takes an interplay between money and quality rule to achieve access to safe water.

Table 5: Regressing Human Related Water Quality on Government Effectiveness, GDP/Capita (Log), Level of Democracy, and an Interaction Term (Regr. Coeff.)

	All countries		Non-OECD Countries	
	regr. coeff.	std. err.	regr. coeff.	Std. err.
Government Effectiveness	30.8***	8.3	26.4**	11.5
GDP/Capita (Log)	13.5***	1.6	14.0***	1.9
Interaction Gov. Eff. * GDP/Capita (Log)	-3.6***	.9	-3.0**	1.4
Level of Democracy	-.0	.5	-.0	.6
Constant	-26.8*	13.6	-30.8**	15.0
Adj. R-squared	.60			

Comments: p>/t/=.01***; =.05**; = .10* The number of cases is 187 countries. See Table 3.

Now things become clearer. To the extent that we can talk about significant effect in regression models with interaction terms, there is an effect of government effectiveness and there is a significant interaction effect. And as the coefficients indicate the effect of the QoG variable is especially strong among less developed countries. The effect is smaller among richer countries. This is an important result. It can functionally be interpreted as indicating that human related water quality can not only be improved with the help of money. It can also be improved by better quality of government. Thus, we arrive at the conclusion that as with so many other things that are important for human well-being, quality of government matters and it matters for quality of water.

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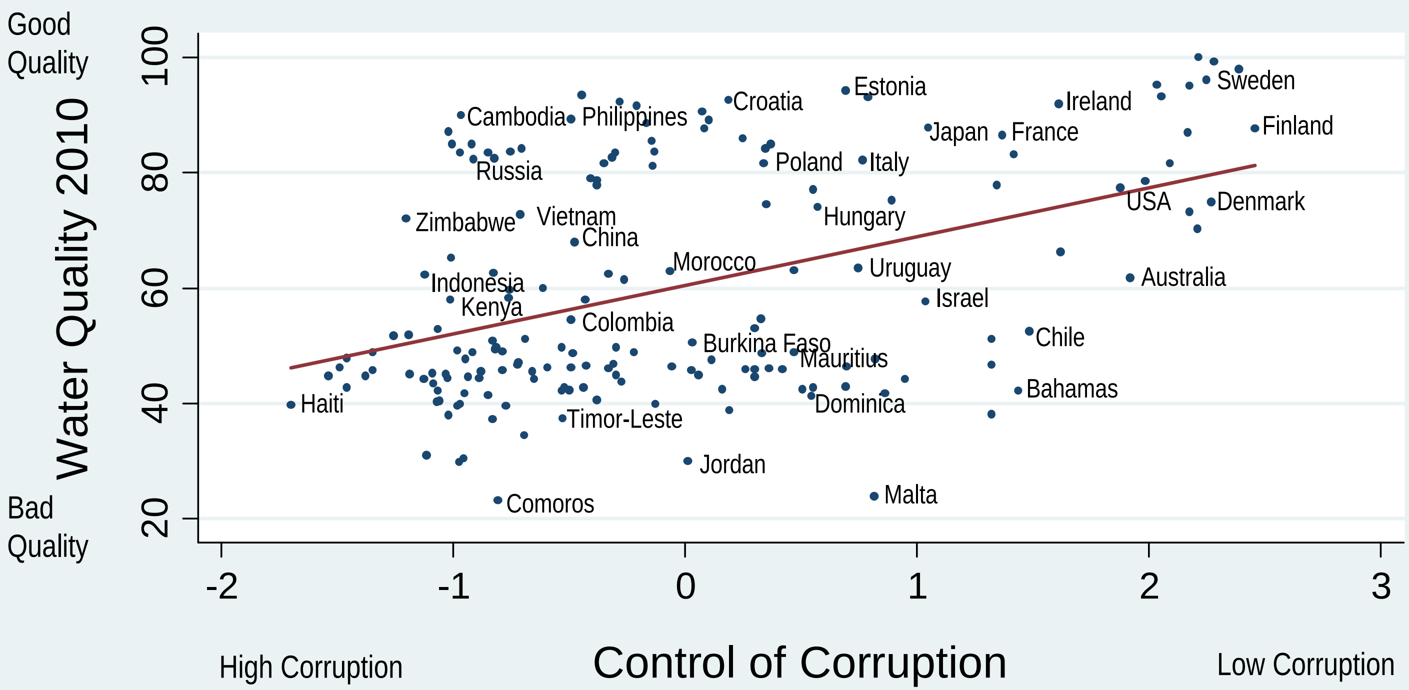
Appendix: Figures

Figure 1

All Countries:
Water Quality 2010
vs. Control of Corruption

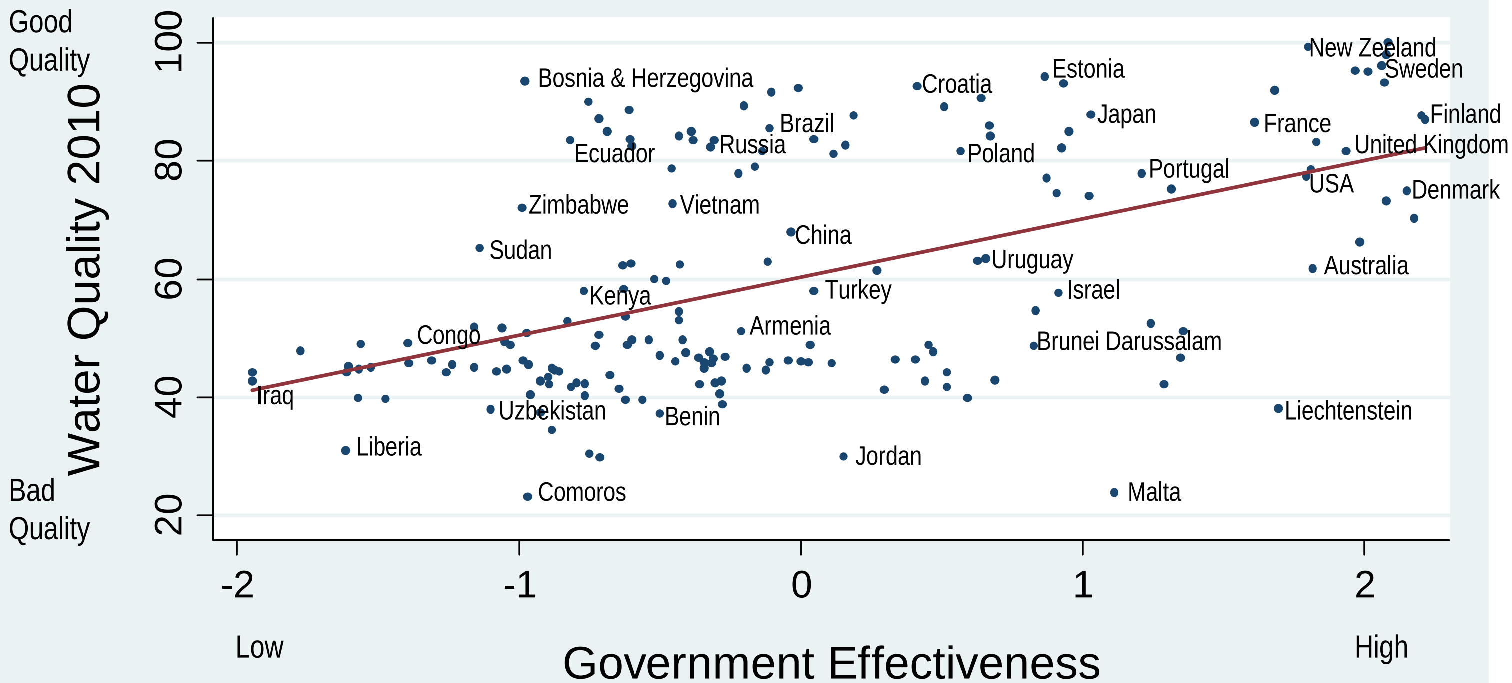


R-squared=0.19

Source: Esty et al 2010; World Bank 2002; see Table 1

Figure 2

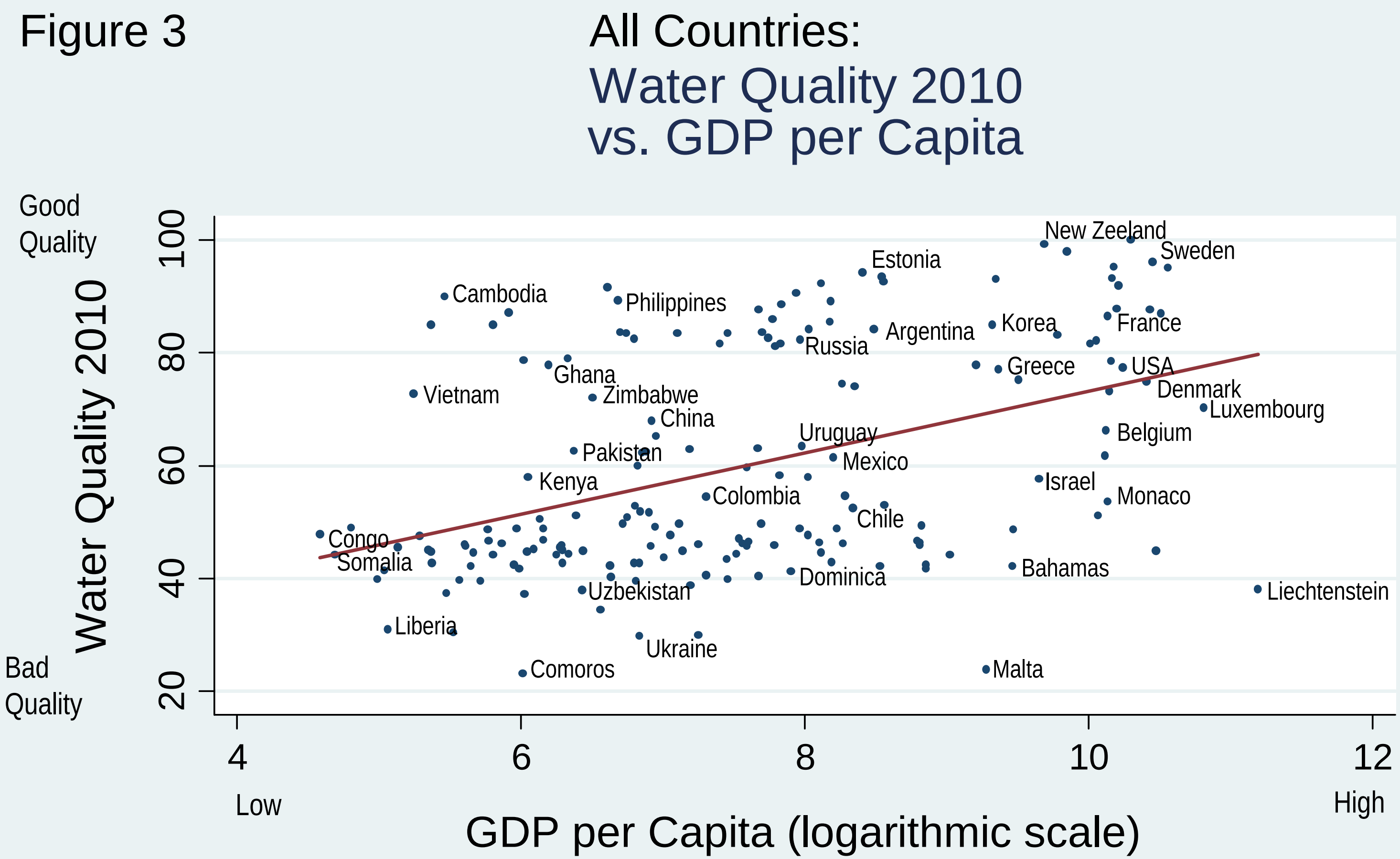
All Countries:
Water Quality 2010
vs. Government Effectiveness



R-squared=0.26

Source: Esty et al 2010; World Bank 2002; see Table 1

Figure 3

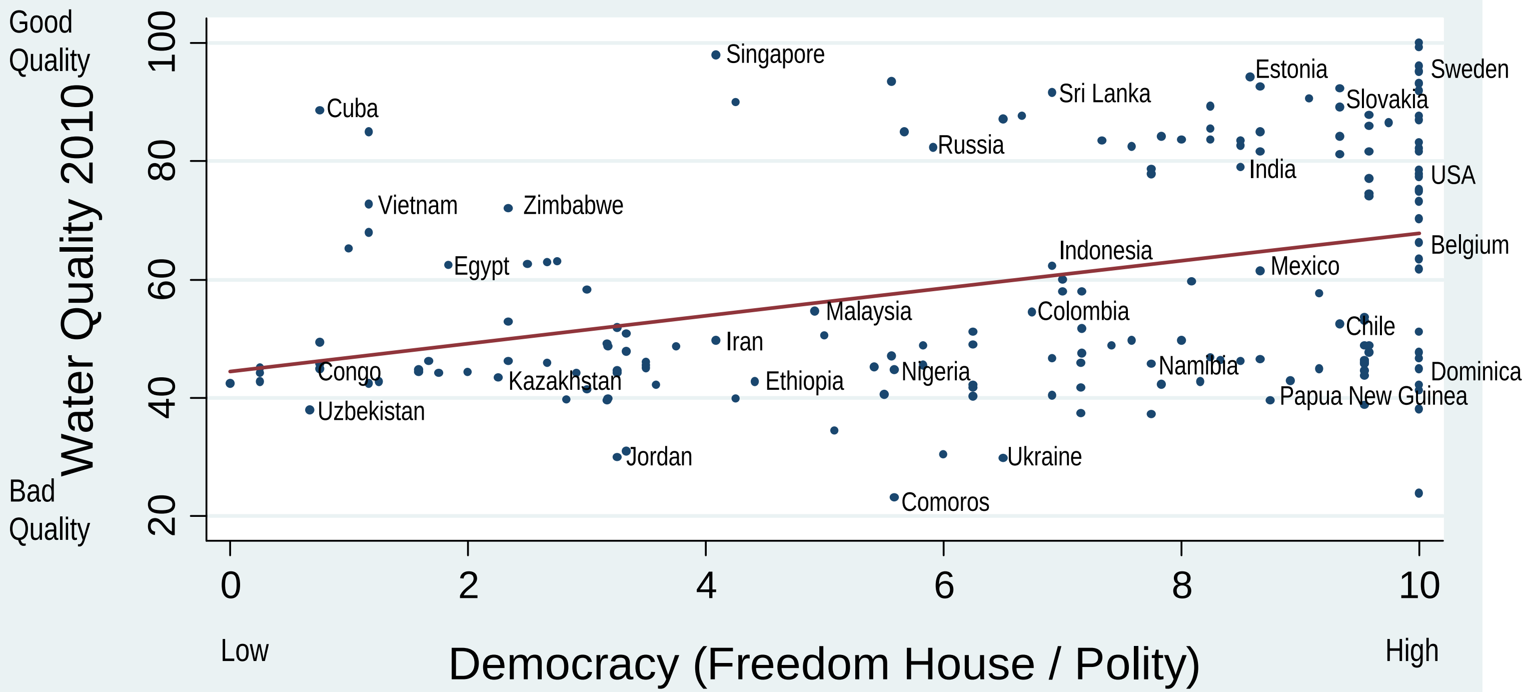


R-squared=0.19

Source: Esty et al 2010; United Nations Statistics Divisions 2002; see Table 1

Figure 4

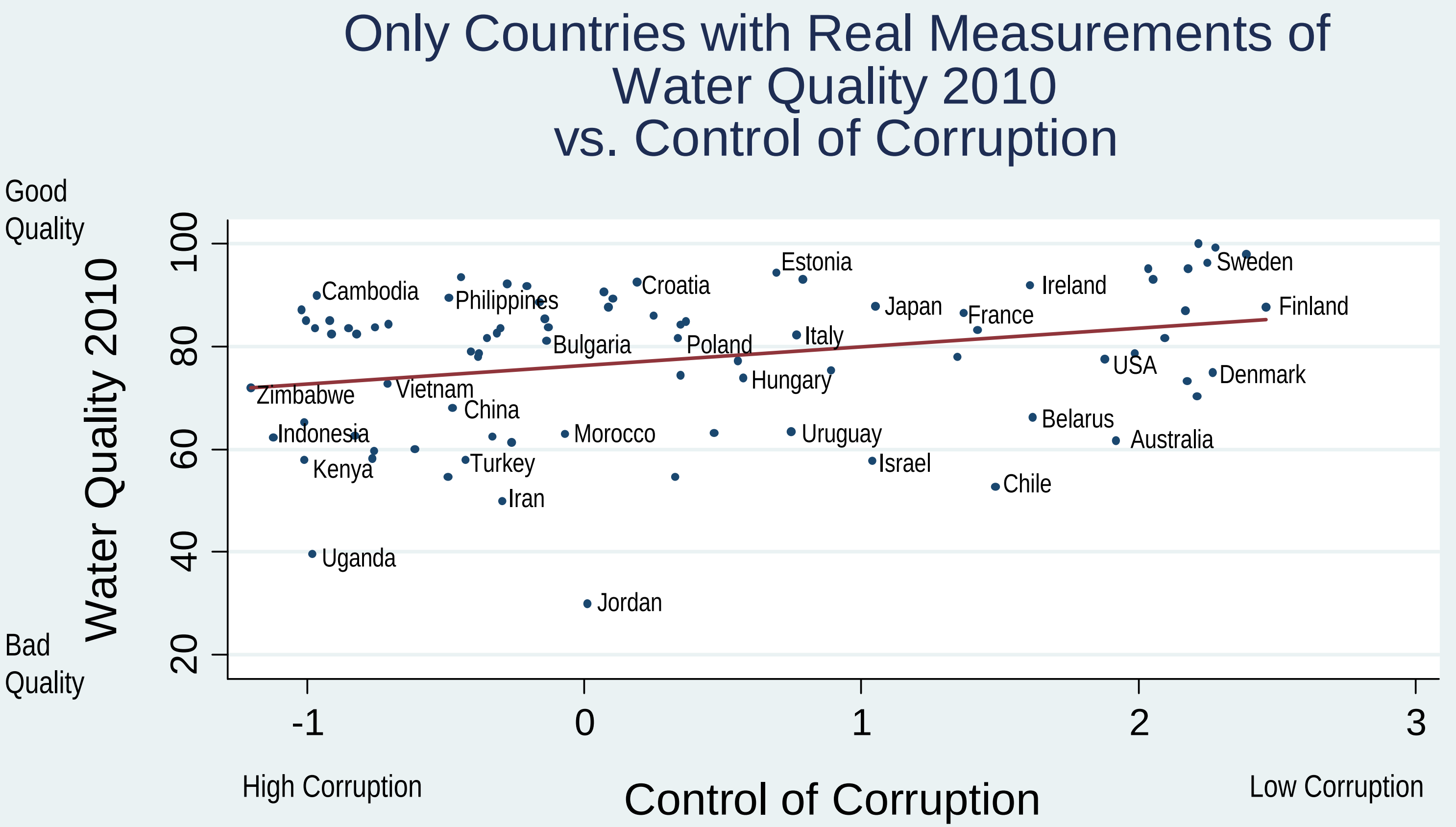
All Countries:
Water Quality 2010
vs. Democracy



R-squared=0.14

Source: Esty et al 2010; Freedom House/Polity 2000-2005; see Table 1

Figure 5

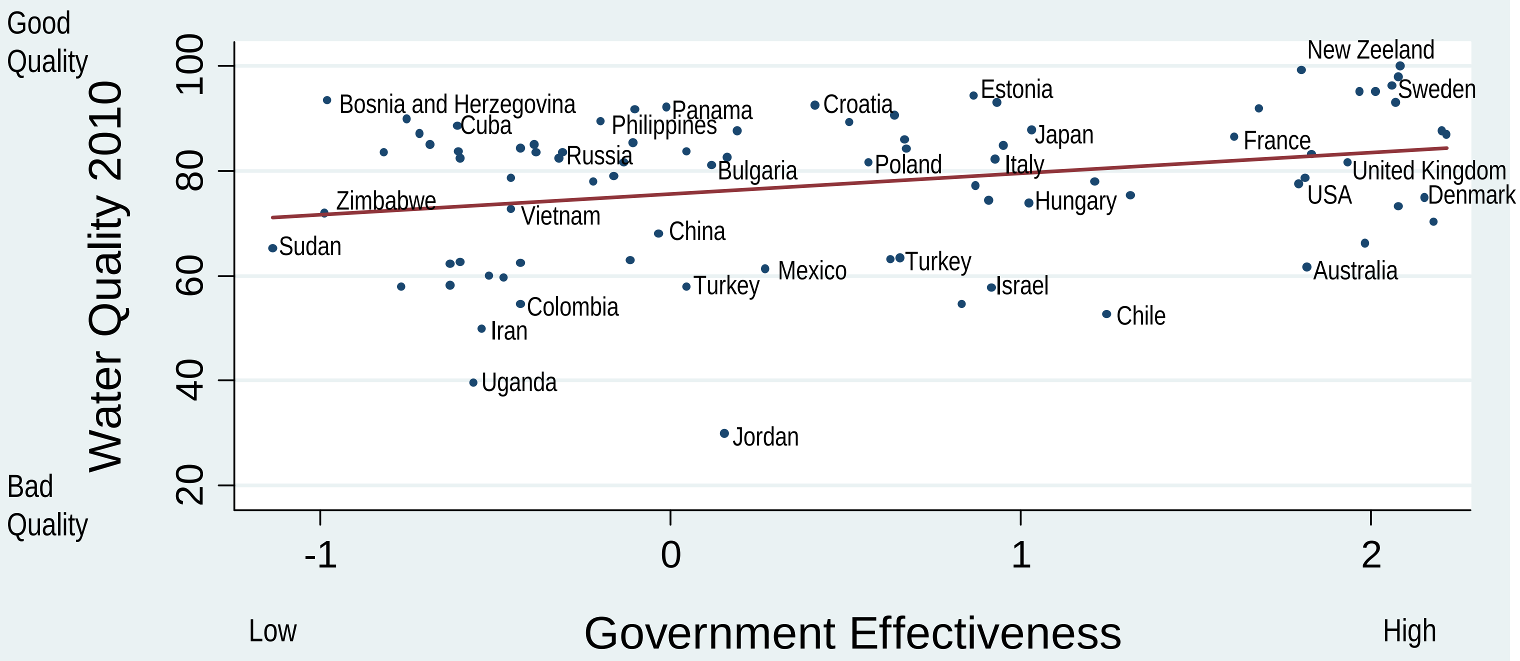


R-squared=0.08

Source: Esty et al 2010; World Bank 2002; see table 1

Figure 6

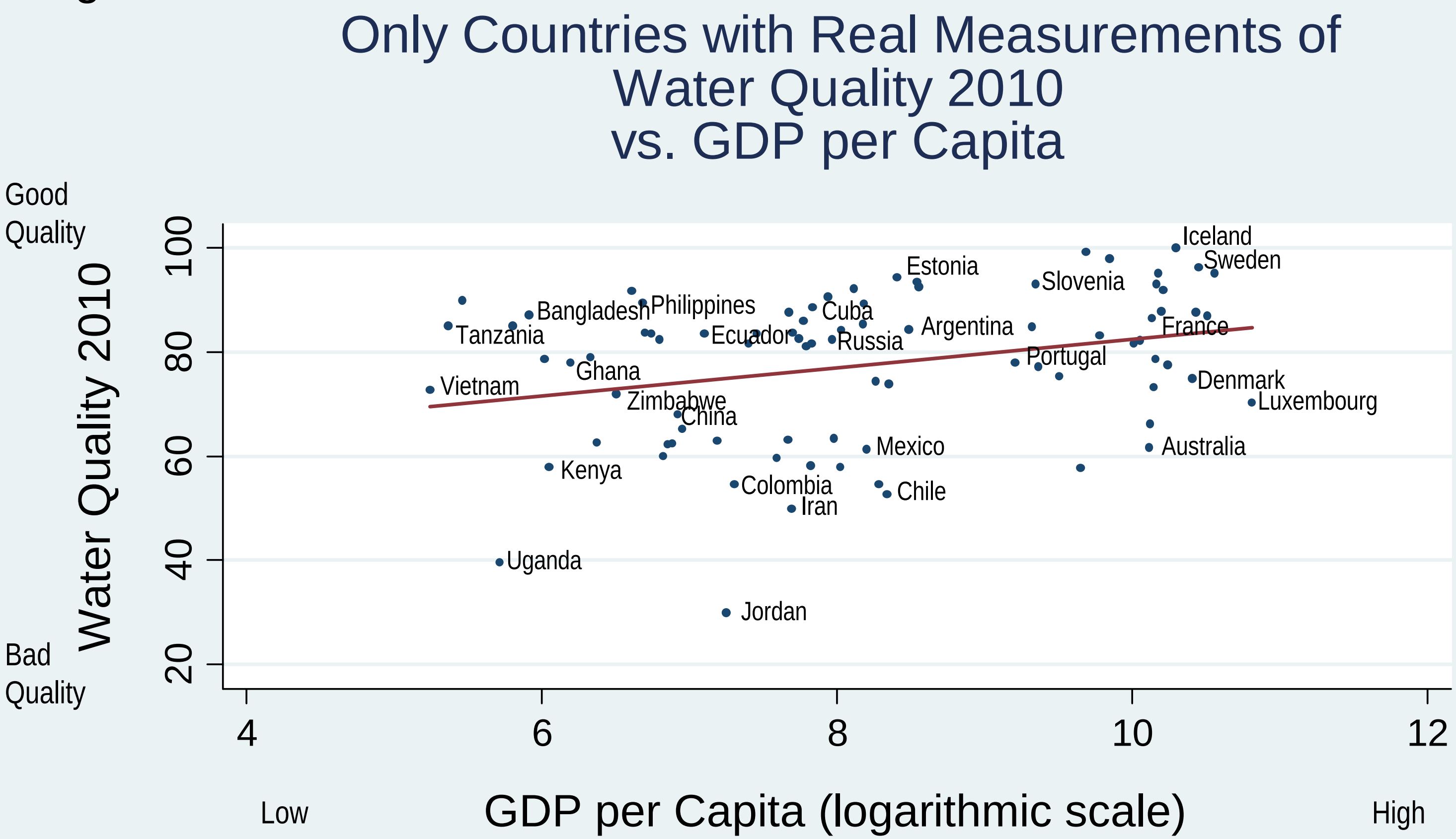
Only Countries with Real Measurements of Water Quality 2010 vs. Government Effectiveness



R-squared=0.08

Source: Esty et al 2010; World Bank 2002; see table 1

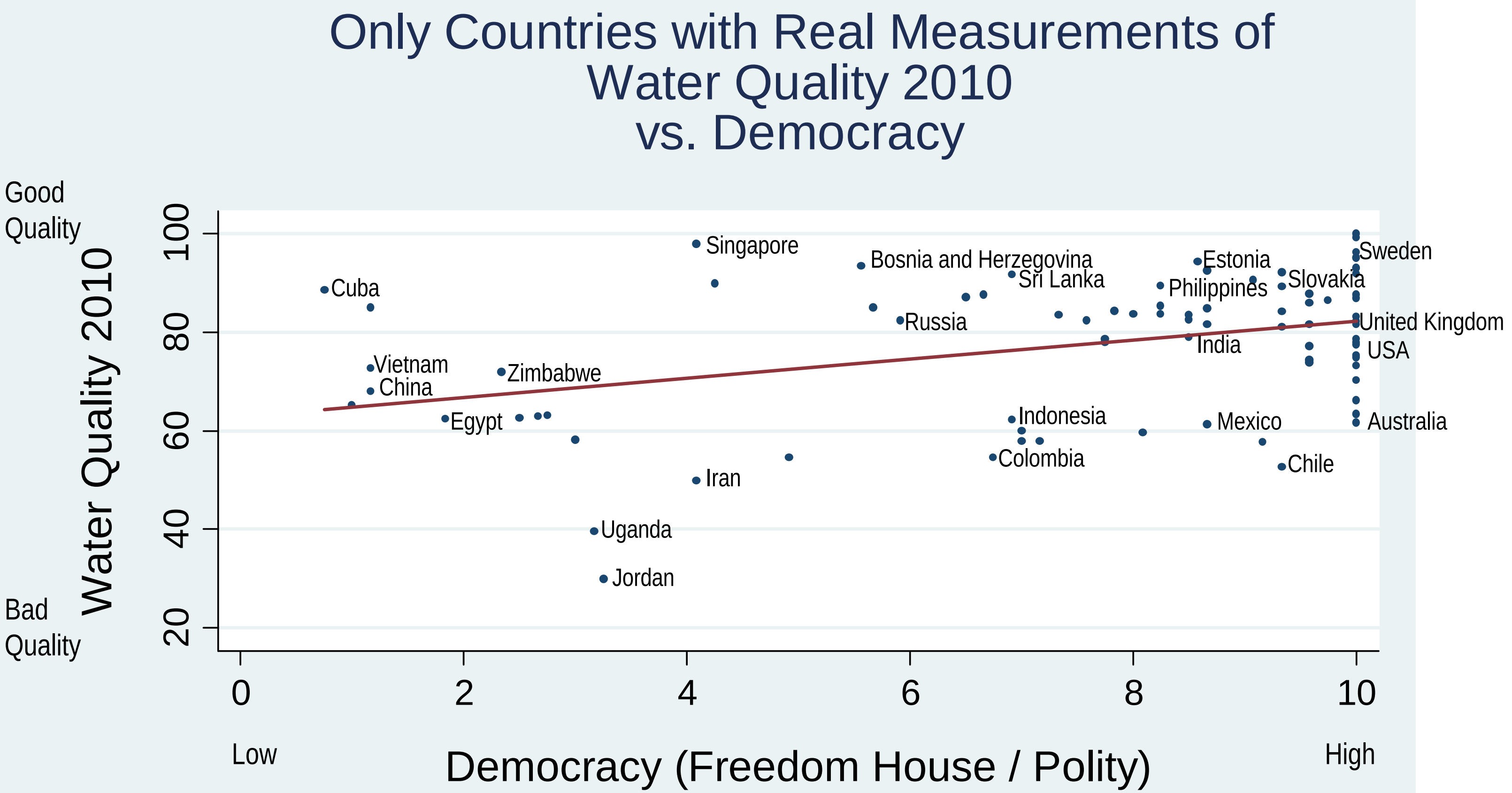
Figure 7



R-squared=0.08

Source: Esty et al 2010; United Nations Statistics Divisions 2002; see Table 1

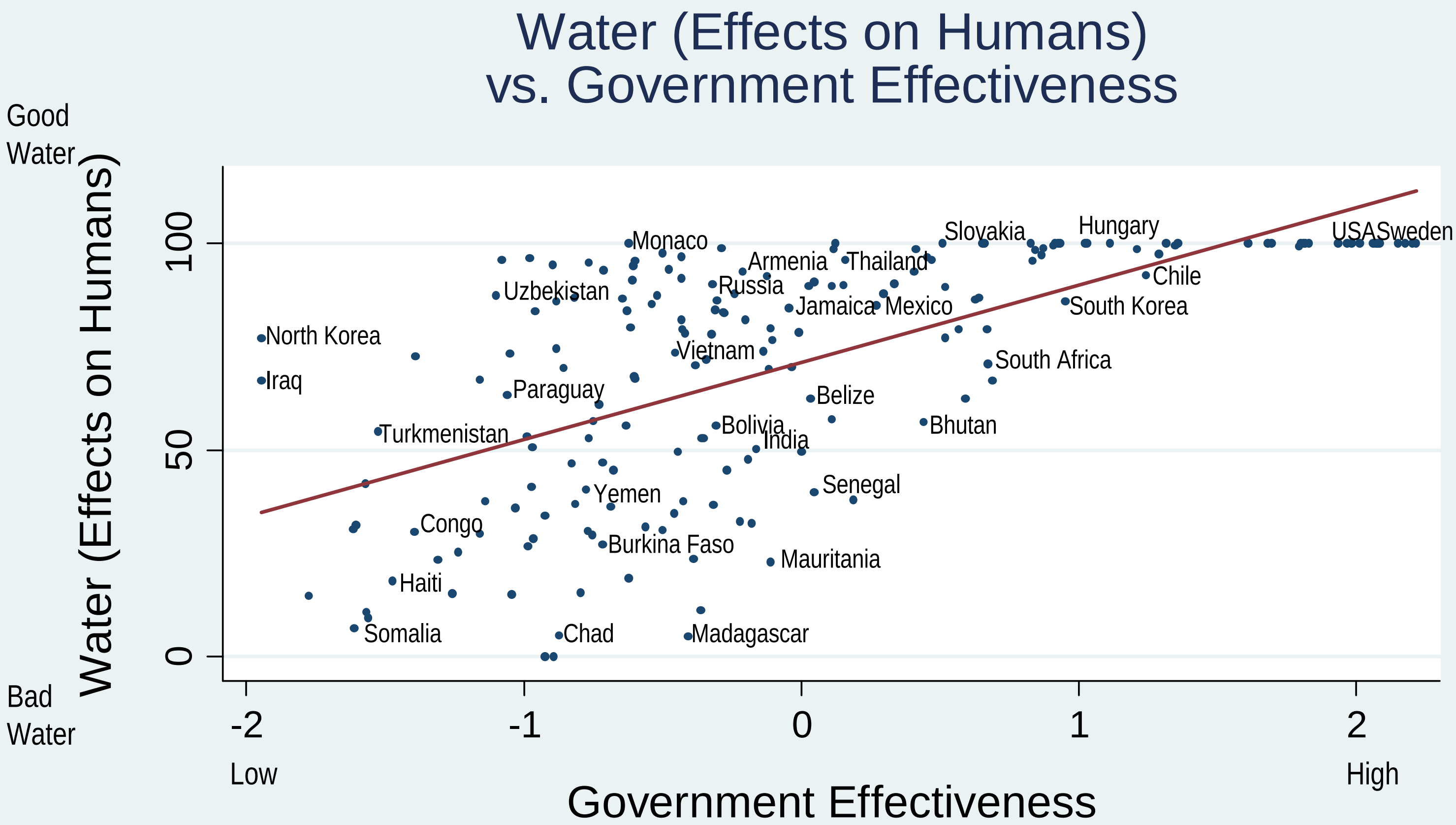
Figure 8



R-squared=0.15

Source: Esty et al 2010; Freedom House/Polity 2000-2005; see table 1

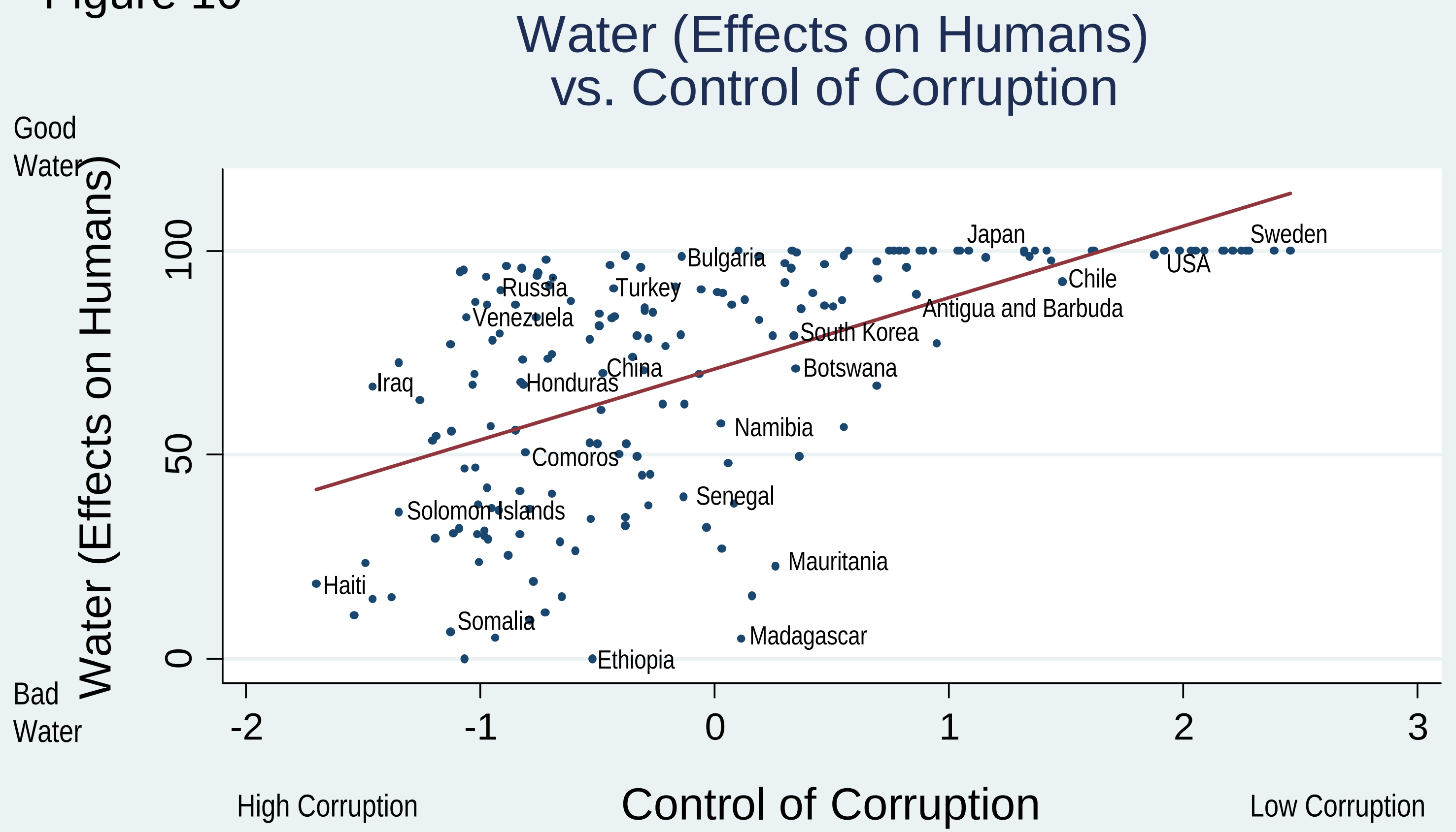
Figure 9



R-squared=0.41

Source: Esty et al 2010; World Bank 2002; see Table 3

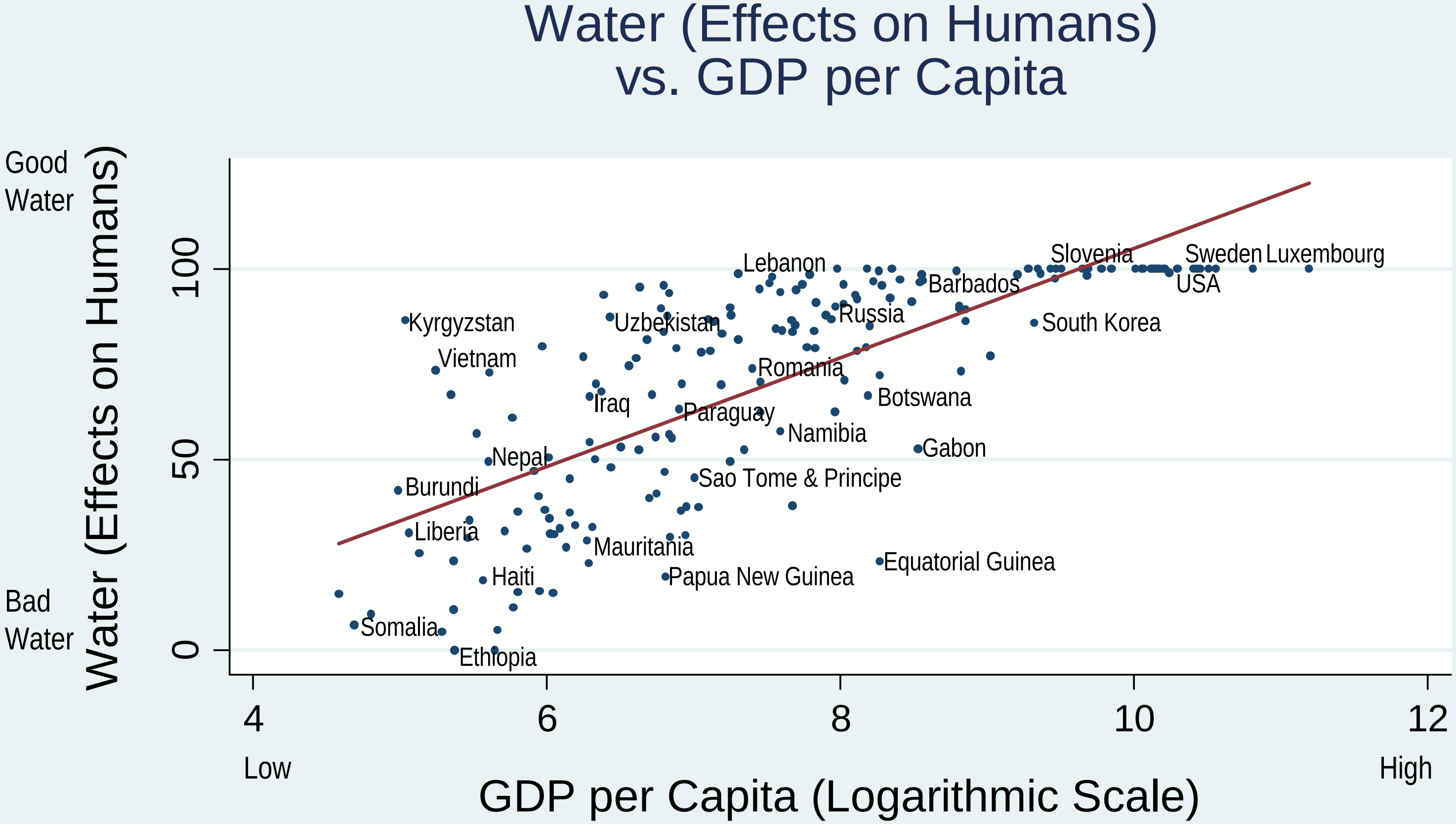
Figure 10



R-squared=0.36

Source: Esty et al 2010; World Bank 2002; see Table 3

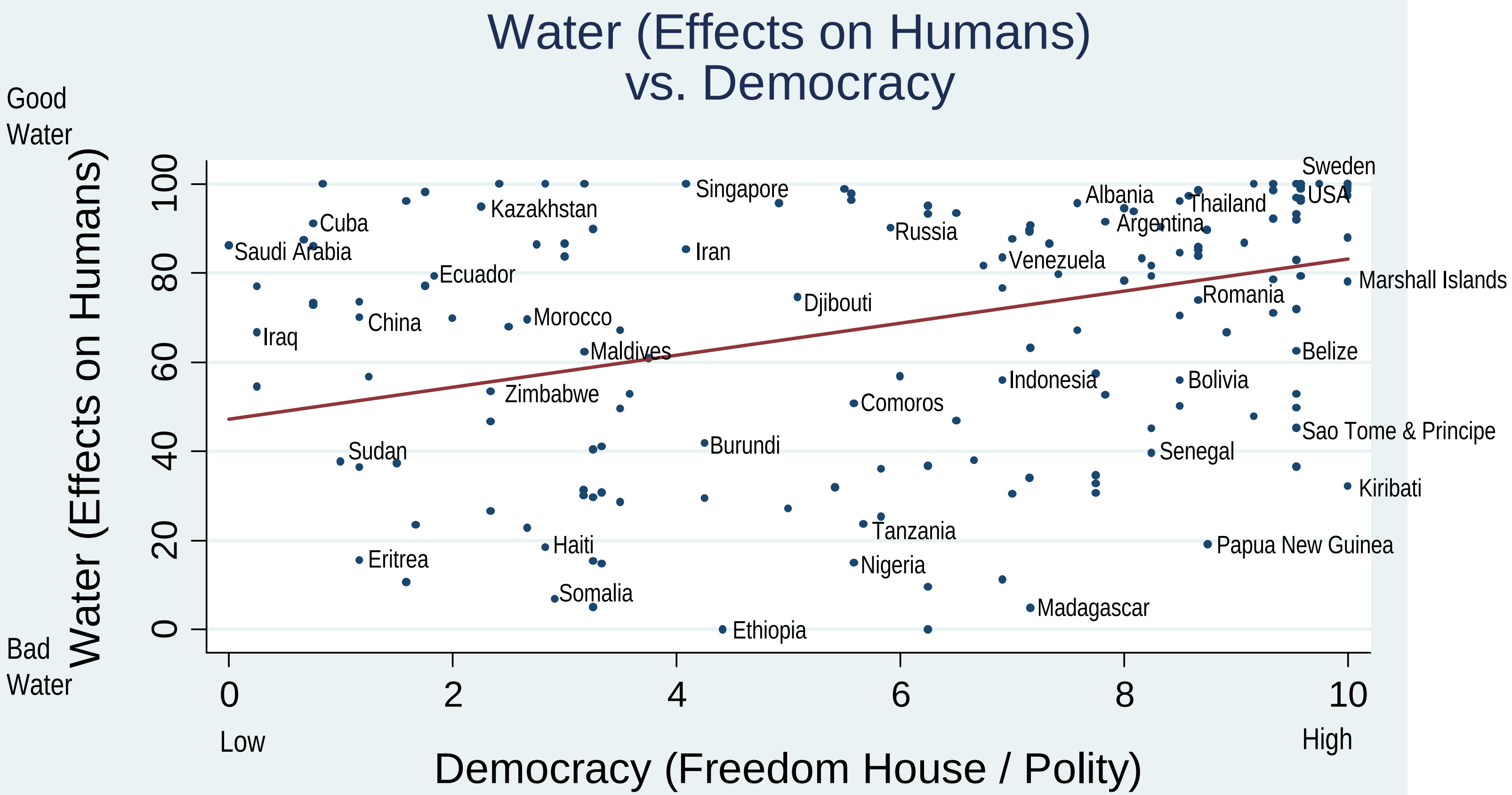
Figure 11



R-squared=0.58

Source: Esty et al 2010; United Nations Statistics Divisions 2002; see Table 3

Figure 12



R-squared=0.15

Source: Esty et al 2010; Freedom House/Polity 2000-2005; see Table 3