Examination of the Effects of Various Water Emergency Scenarios on Inkjet Prints Past to Present

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INTRODUCTION

Many inkjet prints are considerably more sensitive to water damage than traditional photographs and prints, and some inkjet print types can also harm adjacent materials during water disasters[1,2,3]. While preliminary work has been done to rank the relative sensitivities of these materials, a full understanding of how the materials will behave during different water damage scenarios, from small spills to prolonged full immersion, or clean to contaminated water, has yet to be performed. This project was intended to help to fill that knowledge gap and provide collection care personnel with the information and tools they need to retrieve and stabilize inkjet materials following such unfortunate events.

METHODS

Sets of 14 inkjet prints or 10 unprinted inkjet papers, representing inkjet variants from the 1980s to today, and including dye and pigment types as well as a range of support types from uncoated papers to complex inkjet specific media, were immersed for various times (experiment dependent) in tap water, dirty water, or salt water, as well as in stacks or in enclosures. All prints were individually air dried horizontally on fiberglass screens for at least 48 hours at 70°F and 50% RH before being examined visually for change. These were then compared to a set of chromogenic prints to provide context for inkjet damage during water emergencies.

IMMERSION TIME

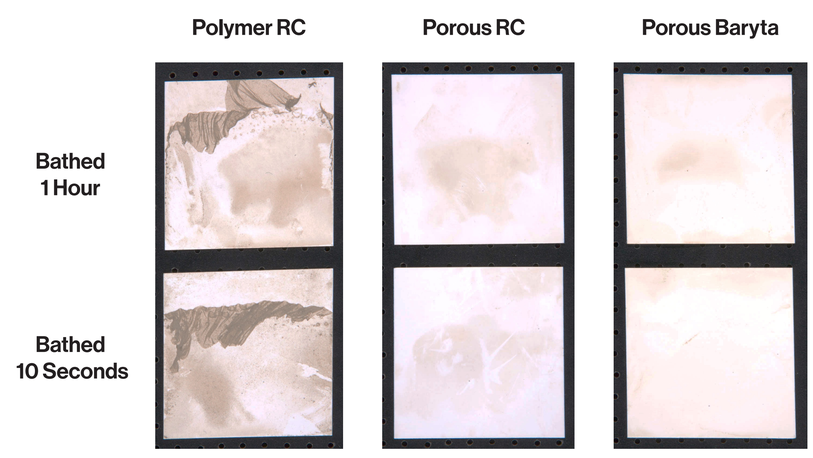
Key Points

- Not all inkjet variants damaged at same rate
- Some instantly destroyed while others survived a week
- Ink/paper combination determined water resistance not just whether dye or pigment ink
- Common assumption that photos can stay immersed in water for 48 hours does not apply to inkjet

DIRTY WATER

Key Points

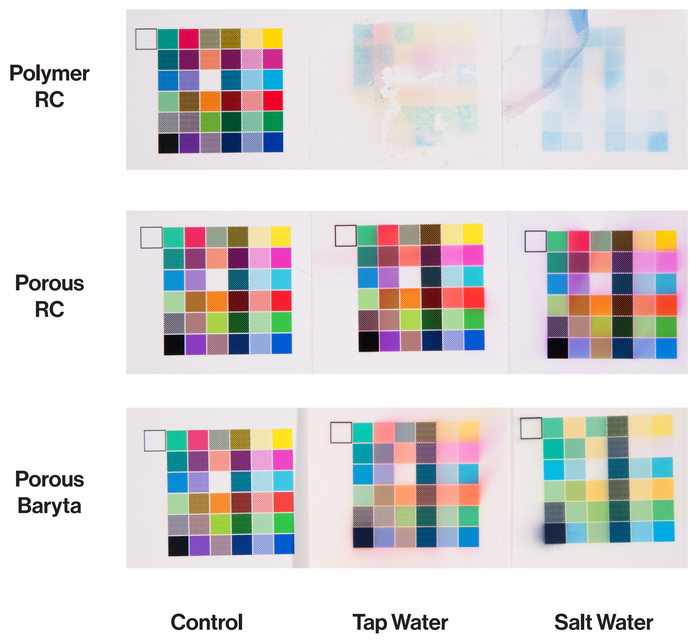
- Staining is tenacious and difficult to remove
- Bathing in clean water to remove dirt and debris for longer than 10 seconds does not improve outcomes and can lead to additional damage to colorant or support
- Save restorative treatments until after drying



SALT WATER (3.5% NaCl)

Key Points

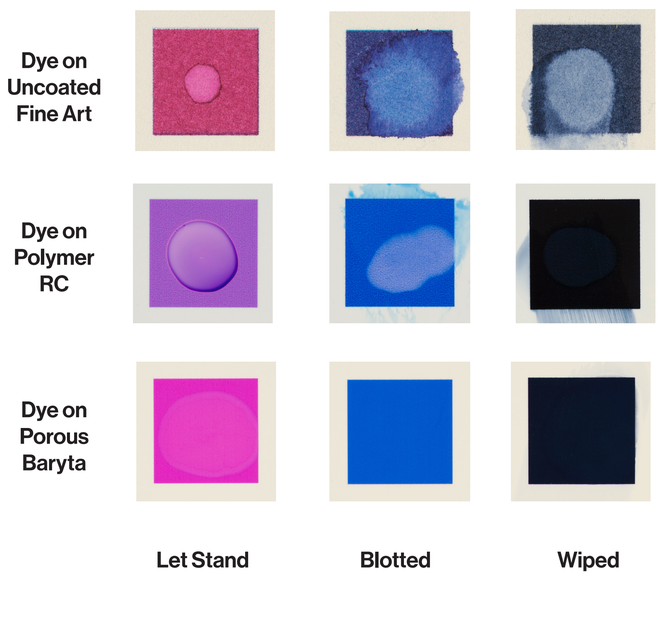
- Salt exacerbates bleed for both dye and pigment inkjet
- Bathing in clean water to dilute salt content can lead to additional damage to colorant or support



WATER DROPLETS

Key Points

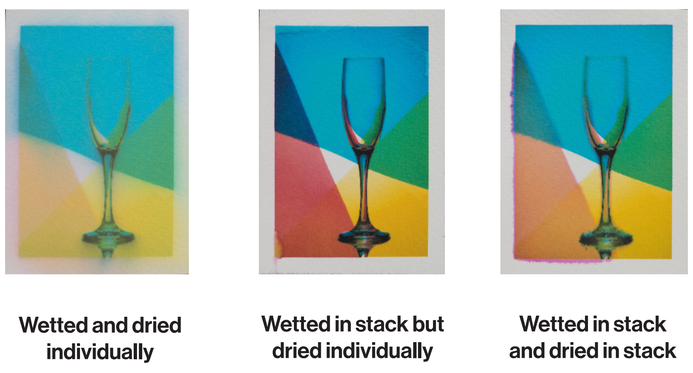
- Wiping water from print surfaces results in colorant smearing and surface abrasion
- Blotting water can be damaging or recuperative depending on paper type
  - Do not blot dye ink on uncoated or polymer coated papers.
  - Allow prints to dry as is
  - Gentle and brief blotting of pigment inkjet prints or dye on porous coated papers may be possible



WETTED IN STACKS

Key Points

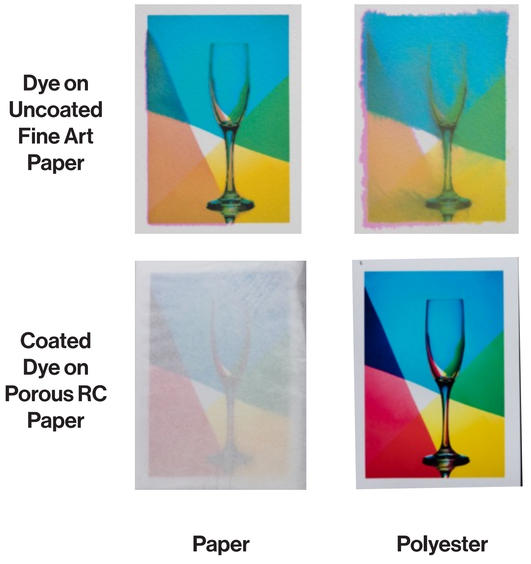
- Inkjet prints in stacks can shield each other during wetting, but drying in stacks furthers bleed and can lead to permanent bonding between prints
- Always separate prints from stacks and air dry individually and horizontally



WETTED IN ENCLOSURES

Key Points

- Polyester enclosures can trap water inside prolonging drying, enhancing bleed, cause ferrotyping or blocking, and result in mold
- Paper enclosures may enhance colorant bleed or permanently block to print surfaces
- Always remove prints from enclosures before air drying



COMPARED TO CHROMOGENIC

Property	Chromogenic	Inkjet*	Inkjet Relative to Chromogenic
Wet time	Lasts extended periods	Destroyed instantly	Worse
Dirty water	Heavily stained	Heavily stained	Equal
Salt water	Slight yellowing	Increases bleed for both dye and pigment	Worse
Stacks	Blocking and ferrotyping	Increased colorant bleed, fiber transfer, and blocking	Worse
Enclosures	Blocking and ferrotyping	Increased colorant bleed and blocking	Worse
Droplets	Faint water spots	Colorant bleed	Worse

*Based on worse inkjet variants – other variants may be more durable and or comparable to chromogenic

CONCLUSIONS

- The sooner materials are removed from water and dried the greater the chance for successful outcomes
- The assumption that photographs can be left in water for up to 48 hours does not apply to inkjet
- Briefly bathe prints exposed to dirty or salt water
- Always separate from stacks and enclosures before air drying
- Do not wipe to remove excess water, blot according to inkjet type
- Current IPI research is focusing on drying methods – air drying, freezing and thawing, and freeze drying

ACKNOWLEDGMENTS

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REFERENCES

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